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Present Labor Conditions in Mexico

The Characteristics of the Mexican Peon, Mode of Life and Efficiency as a Workman. Bad Results of Raising Wages in Sonora

BY E. A. H. TAYS*

As soon as the old Spanish *Conquistadores* had mastered the many tribes of agricultural Indians inhabiting Mexico, they virtually enslaved the natives, and large estates, working hundreds of men, became the rule. The *caballero* (the man on horseback or who could ride) had many men at his beck and call, and did little for himself. So thoroughly was this idea ingrained in the Mexican of the better class, that up to a few years ago he considered it beneath him to carry any article, however small, in the streets. That was what *mozos* (servants) were for.

This sentiment is rapidly disappearing of late years. The young Mexican is beginning to learn that work is not thought to be degrading in other civilized countries; and that, if he wishes to hold his own in the world, he must be able to "rustle" with hand and brain.

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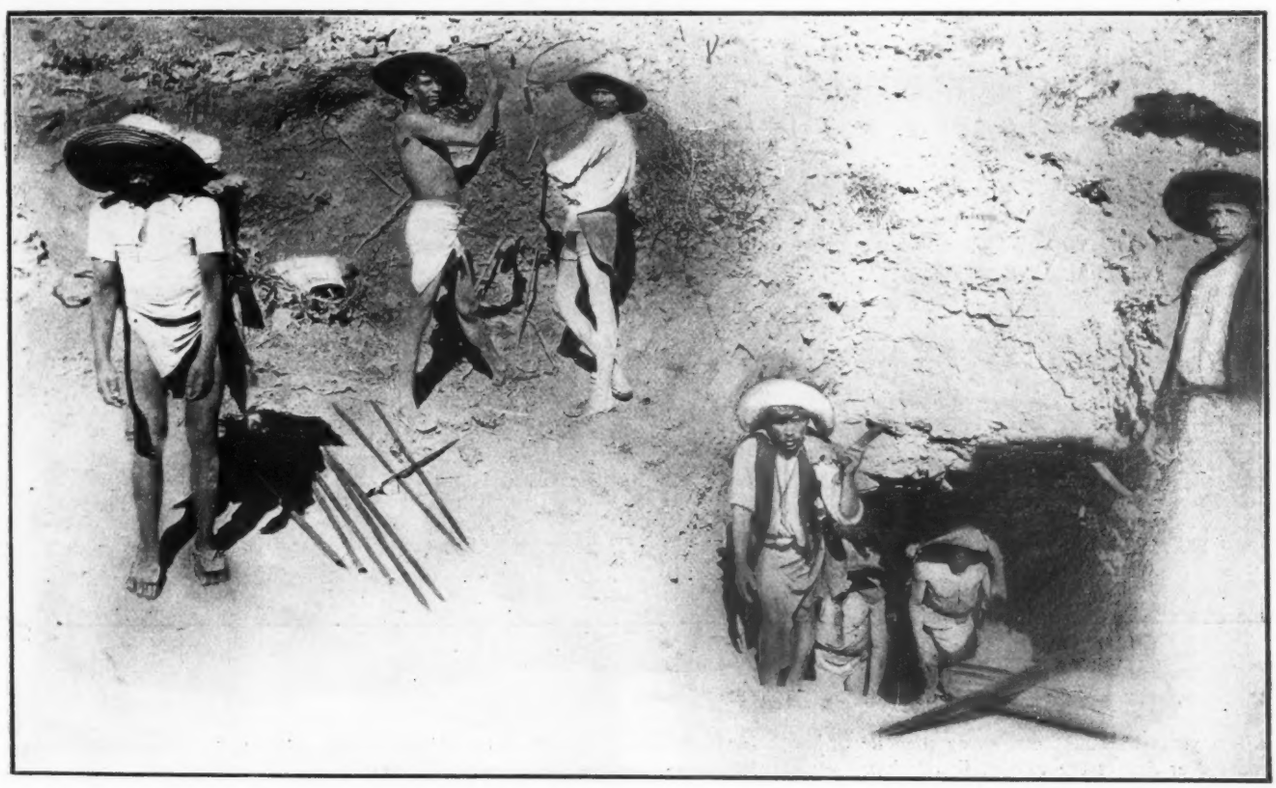
Past Conditions

Until about 15 years ago the laborer's condition in most parts of Mexico was practically slavery. In the agricultural districts the *peon* (laborer) received a general wage of one *peso* per week, and a ration of about two-thirds of a bushel of corn. On this he was supposed to live and raise a family. This was for a full grown, married man, who was supposed to work from sun to sun; and, to insure that he did, the *patron* saw that he got a daily task that only the best men could finish in 12 hours. The ordinary laborer often completed only four or five tasks, but his time was counted on six tasks for a week's work, for which he got the *peso*.

In the mines up to 20 years ago, men rarely received more than 50 *centavos* per day's task, and no ration. Boys under 15 rarely received more than a *real* per day for any kind of work.

To make laborers of the Mexican Indian was an easy matter, for most of the tribes were *pueblo* or town Indians, who lived by labor of some kind and were farmers in a small way; and so ingrained is this instinct, we may call it, that the Mexican laborer in the mines, today, will quit a two or three *peso* per day job, and hie him off to some place to plant a few pecks of corn, as soon as the rainy season sets in. He will stay with it until he considers it safe to make a crop, and will then return to work until harvest time, when he will again drop work to gather in his crop. Should one remonstrate with him and try to show him what a loss it is the reply will be: "Yes, that may be so, but then, I want to eat roasting ears." And this ends it. Many enterprises employing Mexican labor are hampered, more or less, at the beginning of each rainy season by men leaving to put in their crop of corn. As mining and manufacturing increases, however, this custom is dying out.



MEXICAN MINERS AT ZACATECAS

This photograph shows the primitive method of carrying the ore out of the mines by man power, which the steam engine has superseded.

Peonage

The *pueblo* Indians converted into laborers, finally became commercial slaves although nominally free men. The wild nomad tribes, however, were never conquered by Spain, and were only finally subdued through annihilation by the Mexican Government.

The easy going Indian laborer was irresponsible as a financier or provider, and when he needed a few *pesos,* he could get it from the *patron,* as all ranch owners, who employed men, were called, on condition that he work it out at one *peso* per week. In this way, he became practically a slave, often for life; for he had to maintain his family, and had to have some clothing and other things, and these were always furnished at advanced prices. He might never get any more cash, and in a few years he might owe more than he could ever pay at the rate of liquidation. However, if the man died, this debt died with him; but during life he was a slave, and was expected to be on hand every day unless prevented by sickness. Should a man run away or absent himself from work without good cause, he could be punished in many ways, even by whipping. Should he run away and be brought back by one of the *sobresalientes* (mounted men used especially for hunting runaways) of his patron, he could be punished, and be compelled to pay all the costs of his capture.

Women were never put in the fields or at man's work, to the honor of the Spaniard and Mexican be it said, but she was employed about the house in a general way, and the pay ran from 1 to 2½ *pesos* per month and board.

Altered Conditions

Throughout most of the country, north of the City of Mexico, these conditions no longer prevail. During the last 10 years the demand for laborers in the new mines, smelters, railroads, and general industrial enterprises, has caused a gradual increase in wages, until now the field hand earns from 50 *centavos* to a *peso* a day, while the miner earns from 1 to 3 *pesos* per day. The new industrial enterprises have drawn on the farming and ranch districts for hands, and as the available native labor population is not large, there is a general lack of labor in all industries. The call for labor is greater than can be supplied by the native population; and when it is taken into account that the development of the natural resources of the country is in its infancy, it will be seen that immigration is the only remedy.

A high class of laborers such as Germans, English, Irish, French or the North Country inhabitants can hardly be expected to seek Mexico as a home, considering its present crude form of justice. The constitution is all right; the laws are of the best; the Government is reaching a high plane and the Federal officials mean well, as a rule; but the administration of justice, outside of the main cities, is crude and erratic. At times a country judge, if backed by some high State official, will ignore orders of even the Federal Supreme Court, and for that matter, of the President himself, if it suits his ends.

The Government is a strong centralized autocracy and is making rapid strides toward the republican form, on which it was founded; but on account of the ignorance of the masses, general suffrage is out of the question for a time yet, and the less educated of the governing classes are still inclined to be despotic. In general justice is still decided more according to influence than on the merits of the case. All of these conditions are improving rapidly and along proper lines; but chaotic conditions having ruled so long it will be a number of years yet before Mexico can guarantee the higher class of immigrants the conditions they demand and can find in the United States or Canada.

Another thing that has militated against Mexico is, that until a year or two ago, there was no chance for the immigrant day laborer, due to the sufficient supply of native labor and his low wages. Conditions are changing almost daily, and it will not be long before the better class of laborer can count on ample protection if he desires to become a citizen, and upon good wages, for Mexico is bound to progress along all lines, as its natural resources are almost boundless, and are awaiting development.

PAPOGO INDIANS, SONORA, MEXICO

(Photographed by W J McGee)

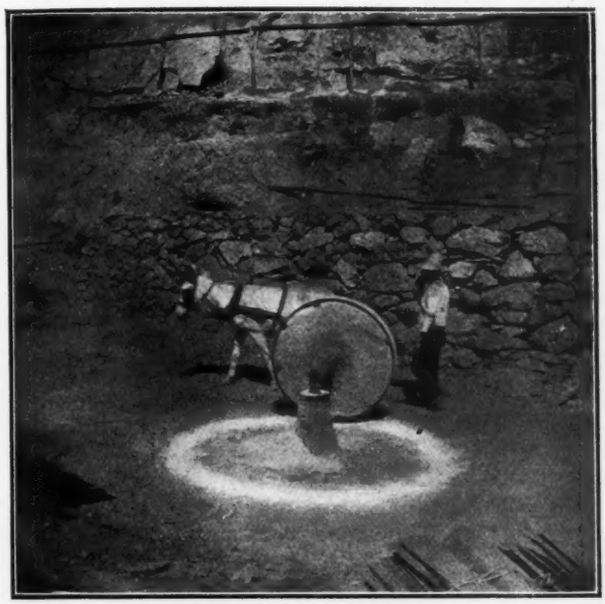
Coolie Labor

In the meantime Mexico will have to depend in part upon labor imported from China and Japan. Chinese have been coming to the country for years in rapidly increasing numbers, and they make industrious, peaceable and, on the whole, rather

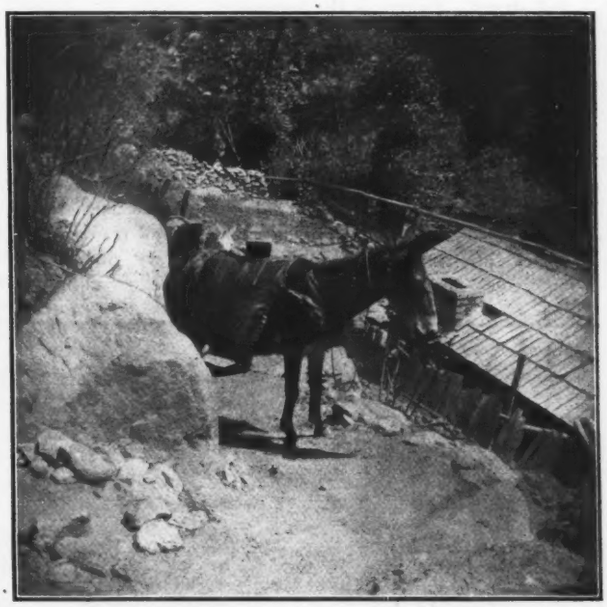
desirable citizens. They make good miners and are easily managed. The Mexican laborer eyes the Chinaman with suspicion. But the Chinaman is wise and wily; he has himself baptized, cuts his hair, dresses in the American way and often takes unto himself a Mexican wife from the working class. When he has up with a Mexican woman. After that, the rest have no trouble. The Chinaman is a good provider, treats his womankind well, and is kind to his family. The Mexican laborer is all to the contrary as a rule, and his women, seeing this, do not hesitate to prefer the Chinamen. Anyway, once the Chinamen start marrying they

EFFICIENCY OF NATIVE LABOR

The efficiency of the native laborer varies in different parts of the country. In northern Mexico and on the west coast he is a pure Yaqui or Mayo Indian, belongs to some other tribe closely allied to the old Aztecs, or he is a cross between these and the Spaniard. As a rule, the



Crushing Quartz



The Water Donkey

A Hard Bit of Trail

Loading Matte

SCENES IN THE SIERRA MADRE

a chance, the Chinaman proves himself to be a good "mixer," and he prospers. He adopts the country's religion for a purpose, as the following sign which appears above the door of a shop proves: "Jesus' Ley Sen—Groceries."

In a given locality the trouble is for the first Chinamen to get married or take usually make a clean sweep, and often get the pick of the native (labor class) women. This makes the Mexican native angry, but, as a rule, he rather admires the enterprise of the Oriental.

Japanese, so far, have not taken well to Mexico, and it is doubtful if they will ever go there in great numbers.

men are well built and intelligent and make good workmen. They are characteristically irresponsible, happy, fatalists. They are poor providers, and never believe in looking out for the morrow. In fact, many would consider that "a doubting of Divine Providence," as they express it. The children of this class are

bright and respond readily to education; and from these ranks will come many of the future leading men of the country, and that too, within the next generation.

The chief laboring class of the country around about the City of Mexico for 200 miles belongs to the Otomi and allied tribes. They are of a lower class, are, as a rule, addicted to *pulque* drinking and are dull and stupid. *Pulque* is the fermented juice of the *maguey* plant and has a narcotic effect. Men of this class make poor and inefficient workers and in a few generations they are doomed to extinction.

The native Mexican laborer is clannish and prone to adhere to his employer if treated at all fairly. He will "soldier," of course, if allowed to, but what laborer can beat the so-called American miner as a killer of time and as a chronic kicker for big wages and his imagined rights? But, I am digressing.

SERI INDIANS, TIBURON ISLAND. BUT FEW SAVAGES OF THIS TYPE REMAIN IN MEXICO

(Photographed by W. J. McGee)

However, the Mexican laborer is quick to see when an employer means business, and he appreciates it at once and admires the superior who exacts compliance, if it is done decently. He often strikes, if he thinks he has been imposed upon, but, as a rule, his strikes only last a day or two, for as he is unorganized, and never has a cent ahead, the empty larder at home forces him to go to work again whether his supposed wrongs have been adjusted to his liking or not. He is very amenable to reason and fair play, and a little tact goes a long way in managing him satisfactorily.

No Chance for Strikers

Strikes, as they are known in the United States, can never take place under the present system of government in Mexico. There is no objection to a man or any number of men striking, but the moment these begin to interfere with other men taking their places, or the moment they begin to destroy property, the Federal Government takes a hand, and the leaders will, in all probability, be shot without trial. There are many things our own Government could learn from Mexico that would in no way impair its efficiency or jeopardize the rights of true citizens. The intelligent, law-abiding, decent citizen should be guaranteed full protection of life, liberty and conscience, as well as, or even in preference to, the labor unions which are often composed of foreigners and roughs controlled by unscrupulous leaders, calling themselves Americans, while they and their organizations trample on, not only the first, but, every principle of our Magna Charta.

The Mexican laborer appreciates the methods of the Federal Government, and is a great respecter of property, and of individual as well as public rights.

The Wage Scale

One of the present troubles in regard to the labor question is how to adjust the wage scale equitably and justly for the native. Up to a year or two ago he had little, needed little, and cared for little. He had never seen any of his kind in better circumstances, and should any of them get a few dollars, in an unexpected way, they usually dissipated it in the most reckless manner.

This being the fact, any money paid to the native at first, above that required to supply his daily needs, does harm in two ways. He works only to live; if he earns enough in three days to keep him and his family from actual want for the rest of the week, he will work three days only and this causes a need of double the men to do the same amount of work. Moreover as he has no idea of saving for a rainy day, should he have a few dollars ahead and not dissipate it viciously, he rarely spends it on his family or in fixing up his home, but will buy himself a $25 blanket, a $30 hat, or if he wants to put on extra style, he buys a $40 pistol. But he may have other tendencies, and the extra money often induces him to try gambling, drinking and other vices. The results are that he spends all he makes, plays his credit for all he can and becomes dissipated, and in a few years is useless as a worker.

The increase in wages is good and should come, but gradually, as the native grows up to it and becomes imbued with the spirit of advancement and self betterment. In Sonora, the Greene company has worked no end of harm by paying wages twice what ordinarily would be demanded, and it has resulted in loss to the company and no benefit to the laborer.

This problem is more serious than any other that confronts the employer of labor, at present, in Mexico.

The capacity of any crusher will depend on the character of the material fed to it and the size to which it is to be reduced. In one case, recently, an Allis-Chalmers machine crushed 595 tons of iron ore, producing a 3-in. product, in 30 min. or at the rate of 11,900 tons in 10 hours. Such a capacity could not be maintained for a full working day, only because of the impossibility of supplying sufficient ore.

Mines of the Taviche District, Oaxaca, Mexico

The Veins Bearing the Silver Sulphide Ores Are Remarkably Free From Faulting and Almost Invariably Appear at the Surface

BY A. E. PLACE AND H. L. ELTON*

The Taviche Mining district is located in and about the town of San Gerónimo Taviche, District of Ocotlán, State of Oaxaca, Mexico. The present railroad station is at Ocotlán, a distance of two hours from the mines by horseback or coach. The new railroad to Taviche is nearly complete, the station being in the heart of the district. The whole section is well covered by wagon roads. The size of the district is about 60 square miles half of which has been denounced in one solid block of claims. The question of supplies is satisfactory as shown by the fact that there are more than 100 mines actually working within 15 miles of the district.

Geology and Climate

The chief rock is porphyry with andesite lying on the east side of a large syenite dike which divides this camp from Octolán. There seem to be no intrusions of other rocks, and faulting is remarkably rare. The veins nearly always appear on the surface, the only exception being that in some places there is a later deposition of andesite, carrying breccia. This rock seems to be the same as the underlying andesite except that it carries the breccia and does not show the veins even where they are known to pass only a few feet below. At various points in the camp this capping occurs, and at these points the veins do not show on the surface.

There are many points where the veins can be seen to go under the cap and come out on the other side. In several cases the workings of mines have gone under the covering, and in all cases the vein has been found to be in its proper place, and to be absolutely unaltered. This capping is in most places only a few feet thick, and generally occurs in small patches. There are, however, places where it is known to be 300 ft. thick. The proportion of the ground so covered is considerably below one fourth of the whole.

The camp lies from 5000 to 6000 ft. above sea level. The climate is that of continuous spring, the temperature varying from 40 deg. in the winter to 90 deg. F. in the summer. These are the extremes. Ice and snow are unknown.

Ores

The ores are nearly all sulphides both above and below the water line which is generally above the 100-ft. level. There is little water in the mines. All of the ores are typical silver ores, and all of them carry gold in good quantities. The most common ores are the light and dark ruby and the black sulphides of silver. Proustite and polybasite are the most frequent and all occur in a quartz matrix. Wherever the veins go below the capping, the surface frequently shows irregular streaks of calcite. This disappears when the true andesite is encountered. The veins are all legitimate fissures, being strong and continuous. Many of them can be traced for miles on the surface. An interesting point is that, up to date, no vein showing good value on the surface, has ever been found which cannot be depended on to show good ore on the 100-ft. level.

The shipping ores occur as shoots, having lenticular form horizontally, but they are continuous in depth. Between these shoots the vein matter is generally quartz carrying commercial values, but varying in the different mines. In the older veins, the values are well distributed throughout the vein, and the shoots are small and not very persistent. The low-grade ores are, however, of milling grade, and the vein is large, sometimes exceeding 50 feet.

The Consuelo, at the 125-ft. level, has a body of ore 16 ft. wide assaying 1200 grams silver to the ton. The gold is not regular, but averages about 8 grams. It the Conejo Blanco there is a body of ore, on the 200-ft. level, 41 ft. wide which assays 700 grams silver and 8 grams gold per ton. In this mine the gold value is relatively high, frequently reaching 25 per cent. of the total. In the San Francisco the orebody measures from 4 to 40 ft., and is of milling grade even after sorting out all the best ore for shipping. The Verónica, La Crúz and San Nicolas are other illustrations of the older veins. Their principal characteristics are that they are mineralized from wall to wall, are large and appear on the surface as outcrops frequently 20 ft. high.

Wherever these veins carry much shipping ore it is found that some other vein has approached closely or actually entered the older one. In these the high-grade ore is found in the form of a pay streak, generally separated from the older vein by clay, and bearing evidences of being a later opening of the hanging wall. These streaks are seldom found in the footwall and are always rich. It seems that the second class of veins entered by way of newer fissures which came to the larger vein, already mineralized, and there filled a reopening of the hanging wall of the older vein. Although they lie side by side in the larger vein, there is a clearly defined dividing line between the two. The new vein has had very little effect on the older vein, which still has good grade for milling purposes. The newer vein is of good shipping ore. In one case the second vein is found to have passed through the older vein, continuing beyond and always carrying shipping ore. It has had no effect on the larger vein, which is neither faulted nor altered chemically.

Other Veins

The second type of vein appears as branches of the older ones. These seem to have been made by a later fissuring that had for its starting point the older vein, and from these veins the newer fractures ran diagonally for varying distances; in some cases forming cross veins joining two of the older seams. Where these do not join two older veins, they have the characteristics of gash veins, although they carry extremely rich ore. Their permanency in depth has not been proved. Up to date no mine has been known to pinch out.

Where the second-class veins join two or more of the older veins well formed walls are found. Sometimes these have short sections that show clay, but they are generally frozen. The ore is the same width as the vein and there is practically no low-grade gangue.

Such veins run from an inch to 6 ft. wide, and are made up of lenses which in the lower levels make ore shoots. The origin of these veins is still doubtful. The grade of ore is always shipping and the best is where the vein is widest.

In many camps only certain classes of veins carry values, and the balance are nearly barren. This is not true of Taviche. In several cases are found three and four veins of different classes in the same claim and all carrying shipping ore. The direction of the vein has no effect on the value of the ore; they are generally parallel, but some are diagonal. The general direction is northwest and southeast.

Classification of Ore

The average value of the first-class ore of the camp, as sold to the ore buyers, is from 10 to 30 kg. silver and 25 to 400 grams gold. The second-class ore runs from 4 to 10 kg. silver and 10 to 30 grams gold. The third-class ores run from 1½ to 4 kg. silver and 5 to 25 grams gold.

The new smelter which has just been blown in at the City of Oaxaca, the smelter at Magdalena and the fact that

*Consulting engineers, Oaxaca, Mexico.

there are numerous ore buyers insure a satisfactory ore treatment.

There are now working in Taviche the following properties: Cubilete group; La Suerte (Rickards estate); El Chivo (Stein estate); Vichache; Ossian No. 9; Rosita; Rosario; Ossian No. 8; Anita; Anita Grande; San Carlos; Providencia; San José; Mariposa; Central group; La Cruz; Benjamin; Conejo Colorado group; Conejo Blanco group; Verónica group; Carpintero group; Lucky Cuss; Protectora; San Angelo group; La Unión; Las Mujeres; Triangulo; Zapote group; Escuadra; San Juan; El Orden; Fresno; Belvoir; San Francisco; Consuelo; Selma; Trinidad; Faisen; Dos Cabezas; El Duende Esperanza; Huevo; Boston; Silver Hill; Ossian No. 4; Madera; Sacramento; Providencia; Detroit group; Altona; Esperanza y Anexas; Juanita; Aurora; and Southern Cross.

Reform in Monetary System of the United States

George E. Roberts, until recently the director of the U. S. Mint, and now president of the Commercial National Bank of Chicago, in an address before the Nebraska State Bankers' Association at Omaha, Sept. 19, on "The persistent agitation for some change in our momentary system which will give a degree of elasticity to it," said that he believed such a reform was needed, and that the need would become more and more imperative as the country grows. With reference to the establishment of a central bank, Mr. Roberts said:

"I would adopt the general plan of the great foreign banks, but I would not have the central bank in this country do a general banking business. I would make it an institution to do business with and for the other banks. If you have any prejudice against the word, suppose we do not call it a bank but a central agency for the existing banks, through which they are to perform certain functions which will be serviceable to them and to the community. It should take over all the Government moneys, just as the foreign banks do. That would end the whole vexed problem of Government deposits.

"Every bank in the country, by reason of its stock in the central organization, would have its proportionate benefit from the Government deposits. The central organization should have the privilege of note issue up to, say $100,000,000, and more under a tax provision. It should make loans only to its stockholders on good, live bills receivable as collateral, or by rediscounts of paper which they endorse. I do not believe it would be wise for the central bank to loan on bonds or stocks at all; I think it would be safer to keep that door absolutely closed and confine the operations of the bank to the strictly commercial field, handling paper which is based on staple commodities on their way to market. There would be no danger then that its resources would be tied up indefinitely in unavailable assets. Its paper would be constantly changing, and the bank would always be in shape to help keep business moving."

Salt Production in Mexico

A United States Consular report on the production of salt in the district of Manzanillo describes the primitive method of extracting the salt from the many shallow lagoons along the coast. At a convenient place, generally at high water mark, the following is constructed: On top of four strong posts, placed upright and protruding out of the ground about 6 ft., a flat covering is built on poles; on top of these about a 3-ft. thickness of dry grass or straw is placed. When completed it is a flat-roofed shed with straw covering. This is to serve as the filter. Underneath this a receiving bowl is made of stone and lime mortar. At one side of the filter and bowl the evaporating pans are made of lime mortar, being shallow tanks not over 6 in. deep and divided into squares of about 150 superficial feet each. This completes the salt works. A layer of earth of one-fourth to one-half inch is then scraped daily from the exposed land that was covered with water when the lagoon was full in the wet season. This earth is carried in baskets on men's heads to the top of the filter and emptied on the straw roof. Water is then filtered through the earth and straw, and falls into the receiving bowl highly charged with salt. The liquid is passed to the evaporating pans, this being done with earthen jars. The sun evaporates the water and leaves the pure salt, which is piled up in the sun to dry. It is then packed in bags and conveyed by mules to the market.

The cost of making this salt is about $3.50 U. S. gold per ton, and it sells for at least twice that amount, even when the prices are lowest. It is considered the best obtained in the Republic, and commands the highest price. About 15,000 tons are now produced each year during the three months' season. With machinery much more could be made, and no doubt at much less cost. There is a ready market for many times the quantity now produced.

The Ely Townsite Company, 25 Broad street, New York, is publishing a series of monthly bulletins, called "Watch Ely Grow," which show by photographs, in a very interesting way the progress in the construction of the works of the Steptoe Valley Smelting and Mining Company, and also other developments at Ely and vicinity.

Copper Mines of Mexico

The Department of Fomento of Mexico, corresponding closely to our Department of the Interior, has recently issued a statement to the effect that there are in the Republic more than 1000 mines operating principally for copper. Of these the state of Jalisco leads with 302; Sonora has 234, Michoacan, 95; Lower California, 65; Chihuahua, 53, and Durango 51. The properties of Jalisco are, however, comparatively small and the production light, so that for tonnage the state of Sonora with its Cananea camp is well in the lead, while Lower California, with the Boleo Copper Company, is a close second.

This latter company, though seldom heard of, because of its isolated position and of the fact that its shipments are all made to Europe, is nevertheless smelting more than 25,000 tons of ore and producing about 2,000,000 lb. of copper each month. The company's holdings consist of 11 groups of mines, most important of which are the Soledad, Providencia, Purgatoria and Las Briscas. Twenty miles of railroad connect the mines with the smelter at Santa Rosalia, and a fleet of sailing vessels belonging to the company connect that port with Guaymas, Sonora.

The latest reports from this territory of Lower California are to the effect that rich placer ground is being found on the Rio Tia Juana (Aunt Jane river), about 80 miles southeast of San Diego, Cal., and that a large Los Angeles company is preparing to start dredging operations.

July Production of Gold in the Transvaal

The returns for July show that gold to the extent of 532,711 oz., of a value of £2,262,813 was produced in the Transvaal. Of this total the Rand contributed 513,655 oz. valued at £2,181,867. The total increase over June amounted to 25,699 oz. The following details of the twelve leading producers on the Rand are given:

	Stamps.	Tons Crush'd.	Oz.	Value.
Robinson...	210	33,900	22,814	£96,908
Simmer & Jack..	320	60,700	22,435	95,298
Village Main....	220	38,100	19,379	82,317
Robinson Deep..	300	40,339	18,078	76,790
Casan.....	220	33,000	15,538	66,001
Crown Deep.....	200	31,925	14,858	63,113
Angelo.....	200	29,500	13,890	59,001
Nourse Mines....	180	33,580	13,848	58,843
Wit. Deep.....	220	33,170	13,520	57,429
Ferreirra.....	120	23,400	13,078	55,552
Ferreirra Deep..	120	12,500	12,893	54,766
Kleinfontein.....	200	32,525	12,309	52,285

As regards profits, the Robinson company reached the high point attained in June and declared a profit of £65,079. The Simmer & Jack's profit was £39,611.

Traveling on the West Coast of Mexico

Notes on an Interesting Region of Mexico. What the Traveler Needs and What He Will Find. Some Business and Mining Conditions

BY DWIGHT E. WOODBRIDGE*

Some conditions existing in the west coast of Mexico have been discussed in the columns of the JOURNAL heretofore. The following notes will be of service to the traveler who may be taken, by interest or curiosity, to that region.

ESSENTIALS IN TRAVELING

Whatever else the traveler dispenses with, let him have good riding mules. They are rather expensive in Sinaloa now on account of the demand that has just sprung up for railway construction and a good-gaited animal for riding will cost, say, $150. A good *mozo,* one who can be trusted to take care of the animals and knows the roads and waterholes, is absolutely essential. He can usually supply packmules. It is important that he be made to do his full work, especially at first, and without assistance from the employer. If one finds that he is overcharging in the settlement of bills at the rate of about one real per peso, it is not well to complain. It is the custom of the country, and was expected by the *mozo* when he made his bargain. It is his little graft. It is well to know something of the special dishes of the region, so that in getting a meal one can flatter the divinity of the kitchen by asking for food other than the interminable *tortilla* and the omnipresent *frijol.* Some knowledge of Spanish is essential, not only to comfort but to progress of any sort. A smattering is easily learned, though to speak the language well, understanding its idioms, its delicacies of expression and shades of meaning, is quite another matter. The Spanish of Mexico and of Castile are two different things, and there is no slight divergence between the Spanish of the educated Mexican and his peon. The latter is clipped and run together full of slang not of the nicest varieties, and hard to follow.

Speaking of the language, there is the word *almood,* meaning a certain measure of corn. It is a curious survival of the Moors in Spain, banished hundreds of years ago from the mother country. This word has remained in the Mexican dictionary to this day.

WAGES AND EFFICIENCY

There is a constant tendency on the part of Americans to pay too high wages, thus upsetting normal conditions, making the peon less capable or desirous of continued labor, and increasing the cost of every article used. Grant Bros., contractors for the Southern Pacific, did this when they made the wage rate through Sinaloa $1.50 per day; $1 would probably have secured as many men. They feared not, had been paying the higher scale farther north, and decided to continue it in the south. They are contractors, but are building the road on a 10 per cent. guarantee. The same unnecessary liberality is shown by many, and in many other ways, and is having a bad effect on labor conditions. It is true among Mexicans, as among all other people, that a high wage scale and efficiency are diametrically opposed.

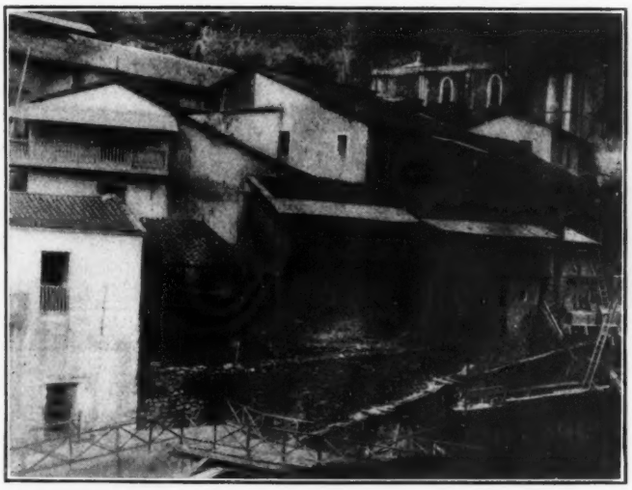
GUNS AND AMMUNITION

Americans who go into the west side of Mexico for the first time—and often later—carry too much in the way of shooting irons. A revolver is good enough to have always at hand, for there is no telling what need may come; therefore the gun to take is a Colt's officers' model, 38 or 44, with smokeless ammunition. As for bigger equipment, all a man wants is something for game, which is plentiful. The natives are too quiet and peaceable to make any further provision for warding off attack than the Colt at all necessary. A 16-gage Winchester pump gun, with plenty of buckshot and birdshot cartridges, is the proper thing. This will give the opportunity for shooting quail and pigeons as well as larger edible wood birds, and also will take care of deer and peccaries if one cares to shoot the latter. The bill of fare can be made much more varied by an occasional hunt.

While the American is usually accorded careful consideration, and receives due attention, there are times when this is not so. A man may sleep unguarded and in perfect safety night after night in the street of some *pueblocito* or under some sheltering *ramada* or tree, but he may suddenly come to grief. There are wandering robbers in the region, just as there are in the United States, and several times this season foreigners have been attacked and robbed; one or two have been killed.

FOREIGNERS AND BUSINESS

As one arrives at Mazatlan and Man-



TYPICAL WEST SIERRA HOME OF SOME IMPORTANCE

CALLE DE PLAS ALTOS, MAZATLAN. DUE WEST THERE IS NOTHING NEARER THAN HAWAII, SEAWALL IN FOREGROUND

*Mining engineer, Duluth, Minn.

zanillo, farther down the coast, he finds more Americans, most of whom are engaged in business and many of whom have been in the country many years. At Mazatlan there is an American club, the Lotus—a rather appropriate name by the way—whose hospitable latchstring is always out for any American who deserves it. At Manzanillo several Americans are in business and the town, which will become a very important port as soon as the long delayed railway is completed, connecting it with the main system of the republic, at Guadalajara, is fairly active. This railway is under construction and would have been completed long ago but for accidents natural to a road in such a territory. It crosses an immense barranca between Xapotlan and Tuxpan, and the work has been swept away more than once. But now things are so far advanced that it is expected the line will be in operation this year. It will give Mexico another transcontinental line and make the most northerly connection of the national railways with the west coast. Many millions of dollars have been spent on the harbor of Manzanillo, and much is expected from the port.

Much of the business of the region is in German hands. At Mazatlan Germans are engaged in banking and merchandizing, and their houses carry large and varied stocks, their goods coming by ship around the Horn. Many sorts of European goods can be bought at prices much less than in the States, but articles naturally imported from the north are high.

In addition to the Compania Naviera, with a number of ships, and the Pacific Coast Steamship Company, running the "Curacao," the Pacific Mail runs two or three ships a month between San Francisco and Panama, touching at Mazatlan and Acapulco. There is a new Canadian line running from Vancouver to Mazatlan under a heavy subsidy, $50,000 from the Canadian Government, and $100,000 from Mexico, for 12 sailings a year. This line has made but two sailings, and it is not yet decided if its ships will go up the gulf to Guaymas. If time permits they will. They are two fast, Clyde-built ocean vessels, and do not stop at any American port.

A Prospector's Imagination

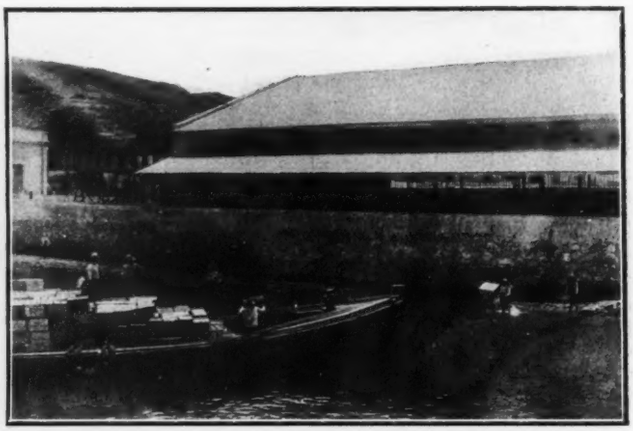
While at La Paz, Baja California, I ran across a trifling incident that proves the whole world kin, and how like his brother elsewhere is the Mexican prospector. An engineer, on his way into the interior of the peninsula, showed me a blue-print map of the property he was on the way to examine. It was a considerable property, with some thousands of meters of underground development, shafts, tunnels, drifts and stoped ground, carrying good silver values, and assay notations on the print giving explicit statements of the character of the lode. His trip was not a pleasant one; the country is waterless and without supplies, very rough and at that time of year intensely hot. On his return to the mainland he told me that there was no mine at all; instead of the development shown by the map there was none—nothing but one or two shallow test pits and trifling open cuts, scarcely as much as assessment work, showing an apparently worthless lode. The man who had brought this property to the attention of investors had nothing to gain by misrepresentation; on the other hand, everything to lose. There seems to be an inherent desire on the part of many prospectors to make a good showing, even though they know the facts will disprove their statements.

Lower California

Baja California, by the way, is probably mineralized to a considerable degree, but its repellent climatic conditions are such as to preclude explorations over a large part of its area except at heavy expense. Over much of the peninsula no rain has fallen for a long time; in some parts there has been none for seven years. So there is no vegetation; there are no supplies, no wells, nothing but the bare rocks rising from the salt water of the ocean. While there are considerable deposits of hematite ores in the interior, unavailable for the present at least, and several mines more or less active, north of San Jose del Cabo, near the southern end of the peninsula, the chief mining interest of the region is that of the Boleo Copper Company, at Santa Rosalia, near Guaymas.

The Boleo company controls the coast for many miles, under concessions from the Mexican government, and is a very serious obstacle to any outside prospecting operation, not only within its limits, but outside of them. The company does not desire too much company along the peninsula and has succeeded in discouraging many embryo enterprises. Boleo is one of the Rothschild activities and, in common with many affairs of that great house, is maintained under as tight a bar of secrecy as that imperial house can provide. It is impossible for the stranger to visit the mines or smelter, unless he creeps in unknown to the management. He cannot walk in Santa Rosalia except on a few prescribed streets, and he cannot secure accommodation for a night at the one civilized hotel in the place without an order from the manager of the company. If he is in the employ of the company as a common miner, he has recently had his wages raised from 62.5c. a day, gold, to $1, because he has been very hard to get hold of just now; he is unable to buy supplies of any nature other than in the company store or to live under a roof not owned by the company. If he arrives at Santa Rosalia on a Mexican ship he goes ashore in a small boat; if on an American, he steps off at the pier, but both ship and pier are lined with Mexican soldiers and Rurales, in company pay, to make sure that no man gets away except those permitted by the management—doubtless a very necessary provision.

STAMP AND CYANIDE MILLS OF GUADALOUPE DE LOS REYES. THE MOST IMPORTANT MINE IN SINALOA

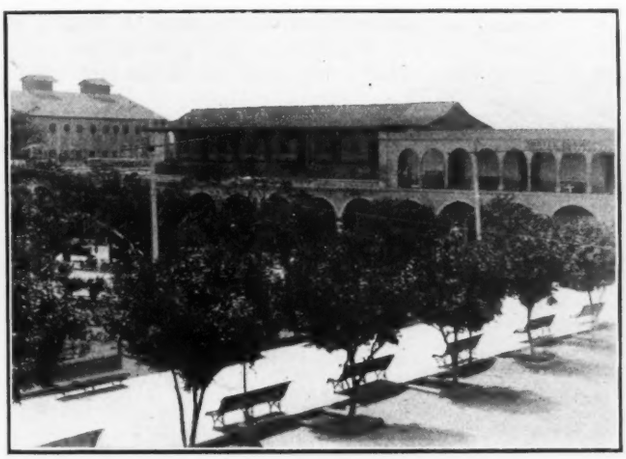


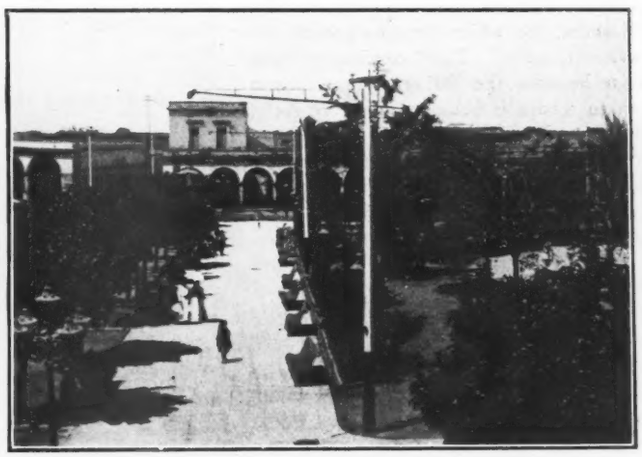
FREIGHT HANDLING AT MAZATLAN. PEONS CARRYING GOODS TO THE LANDING STAGE

Operations at Boleo

Some of the methods of the Boleo company are rather archaic, and are interesting from that point of view; others are well up to date. The company operates 10 small blast furnaces of capacity for, say,

150 tons each. It makes part of its mineral into black copper, mattes the rest, and ships matte and some ore to Europe for treatment. Its equipment is largely French, though there are some American and some Swiss machines at the works. Coal and coke are imported from Germany, at low freights, and the method of handling cargoes is antiquated, ships of from 4000 to 5000 tons remaining in the harbor for months while unloading. Boleo ores are in bedded conglomerates, tuffs and sandstones; the mineralized beds are from 2 to 10 ft. thick and average about 4 per cent. copper, though in places much richer. No concentration is attempted, ores are handsorted and fines are briquetted. Boleo's production is not far from 20,000,000 lb. a year, and it is the only large mine on the peninsula. It is generally believed that the monopolistic concessions under which it now operates will be abrogated or much modified as soon as the present terms expire.





SCENES IN CULIACAN, THE CAPITAL OF SINALOA

La Paz is the seat of the west-coast pearl fisheries, and a thriving trade is carried on by an English syndicate, under concession, and a few independents who deny the monopoly of the concessionaires. Pearls of very large size and high value are sometimes found, and there are several cases in which fortunate pearl fishers have been enabled to retire from business on the result of one shell. I would suggest La Paz as a suitable place of retirement for any gentleman meaning to leave his country for his country's good; for there, in addition to the charms of seclusion, one may meet characters so nearly identical with those in Stevenson's "Treasure Island" that they seem to be replicas.

Natives and Labor

The natives of the west coast are a reasonably honest and very quiet people. Possibly the long absence of foreigners has something to do with this, for they differ materially from those of Guanajuato and elsewhere on the interior plateau. For three months my party slept out of doors every night, under *ramadas*, in the shade of trees, in corrals, on the village streets, or wherever we could; our clothing and valuables laid in the most convenient places near us, and no guard was maintained, but never was the smallest article stolen. Indeed, losses of trifling valuables were so few as to be beneath mention, the natives picking up and returning anything they found. To be sure they had a method of getting even, as sure, perhaps, by overcharges for accommodations, but this is always subject to negotiation and revision.

The labor question is a serious one; so great is the present advance of improvement and such the call for men that any new enterprise must regard the problem as one of the most important and perplexing it will be called upon to meet. Not only are mine enterprises increasing, but the railway situation is such that a great drain has come upon the supplies of the region, a district which is limited in its men and in its capacity to supply more; a region, too, where a few days' work will provide the means of subsistence for a long time. Russians, Chinese and Japanese are coming in by the shipload, but what these will amount to remains to be found out. It is a rather curious commentary that Chinese coolies and Russiar laborers are coming on the same ships by the hundreds.

Manufacturing

Considerable manufacturing is carried on down the coast, chiefly in sugar, liquors, cigarettes, matches, beer, leather and leather work and small iron work. Except for the few larger factories of these articles the entire region is one of small home shops, in which individual artisans fabricate their single lines of hand-made goods. There are many sugar mills along the coast, some of them of considerable size. Just now a German banking syndicate is attempting to consolidate them all into a big trust, after the plans so prevalent on both sides the Atlantic. There is no pure-food law in Mexico, or, if there is, it is not heeded. Certain sugar factories in the Culiacan district utilize their waste low-grade molasses, fermenting and distilling it and manufacturing therefrom, by the aid of the organic chemist and the color-label printer, every variety of liquor that man can want. These include anything from Scotch and Canadian whisky to champagne, from sparkling burgundy to chartreuse, and all the long list of distilled liqueurs of France. It is only fair to state that these numerous compounds are recognized much more readily by their diverse labels, colors and packages than by any marked diversity of flavor. But a large and remunerative trade is done down the coast in these alluring blends, and they seem to have the desired effect. There are many factories producing, from the leaf of the maguey plant, both rope and *tequila*, the former a harsh, sharp and stiff article, almost universally used, and the latter a double distilled *mescal*, entitled to the same characterization. Weak-willed Americans with a taste for drink are somewhat liable to become "*tequila* fiends," in which case their future is reasonably certain.

Haciendas

In traveling through the interior one will ocasionally stumble across some hacienda, the center, perhaps, of an estate containing hundreds of square miles, with its cool and commodious dwellings for the Spanish patron, with flower-filled patios and scores of well-trained servants, responding to the slightest wish; and with its great stocks of all kinds of goods, its clerks, its factories, perhaps its mines, its wide fields of maguay, pineapples, bananas, corn, its forests, its villages of dependents and its life like that of the Southern plantation before the war. Its great man will meet you with the most courtly hospitality, will drive with you for an entire day along a road through his own lands. He may use a carriage made in South Bend, with seats that can be manipulated as a

Pullman berth, and he may harness to it six or eight fine animals that will run at a gallop for hour after hour. He may take you into the sierras, following his carriage with wagon loads of servants, supplies, bedding and the like; he may drive 60 to 100 kilometers to the city to call on you, bringing along a cavalcade of 25 to 30 mules and wagon after wagon of servants and supplies for a brief sojourn. All this will impress you with a sort of life that the northern parts of the United States have never seen and that departed from the South, never to return, 50 years ago.

Concessions

The whole region is cursed by the system of concessions, a species of indirect taxation through which the governments of State and Republic seek to remunerate friends at the expense of freedom of trade. For instance, there is at Mazatlan a concession by the Federal government under which a certain Mexican was given the monopoly of handling goods between ships and shore, for which duty he got an extravagant price. This concession was given because the father of the young man to whom it belonged until recently, once or twice did some act of kindness to President Diaz at a time when such acts meant more than they could mean today. It has lately been purchased by an American syndicate, which expects to put in machinery to handle goods with ease and speed. The Southern Pacific road hopes to nullify this concession, so far as its traffic is concerned, by placing its terminals and docks some miles out of the city. Another concession exists there for the burial of the dead, another for the street railway to the burial place, and there are many others on classes of business as necessary as these.

Santa Rosalia

Santa Rosalia is a port where the Compañia du Boleo receives and ships its freight, where are located its copper-smelting furnaces and its headquarters. The mines produce a tonnage exceeding 250,000 tons per year. Doubtless more than 25,000 tons of fuel is received annually from German ports and a considerable quantity of ore, as well as all the product of matte, is shipped to Europe. The harbor has piers and breakwaters, at which a ship can lie and discharge cargo directly upon platforms or into cars, and where the average cargo of, say, 4000 tons, could be taken out of a vessel in a few days. But these ships lie in the harbor and are anywhere from three to four months in discharging cargoes of coke and briquetted fuel. Toy tugs pulling insignificant lighters, each lighter carrying four or five baskets of a ton capacity, puff slowly across the bay, the baskets are hoisted aboard, dropped into the ship's hold, shoveled full, pulled out and replaced in the lighter, and the tug puffs across with its tiny load to a pier, where the baskets are hoisted and dumped on a car holding some three or four tons, which is in its turn carried off to the stock pile. To one accustomed to unloading rigs that discharge a thousand tons an hour the whole operation is petty in the extreme. But the port handles freight enough to warrant a fast plant and the company is paying large enough dividends to show that it has money with which to better its earning capacity. I saw, at Santa Rosalia, a flat car, steel frame, of about 14-ft. wheel base, under which were set three pair of wheels on a perfectly rigid frame! How such a car could turn any of the sharp curves on the company's narrow-gage line passes comprehension.

The Production of Asphalt and Bituminous Rock in 1906

According to the U. S. Geological Survey, the total production of asphalt in the United States in 1906 amounted to 138,059 short tons, valued at $1,290,340, as against 115,265 short tons, valued at $758,153, in 1905, an increase in 1906 of 20 per cent. in quantity and of 70 per cent. in value. The production of the several varieties in 1906 is shown in the following table:

PRODUCTION OF ASPHALT IN 1906, IN SHORT TONS.

	Quantity.	Value.
Bituminous sandstone	24,085	$70,686
Mastic	2,543	24,158
Hard and refined, or gum	24,178	341,106
Liquid or maltha	9,900	86,750
Wurtzilite, Gilsonite	12,947	159,960
Grahamite	1,952	16,432
Oil asphalt	62,454	591,248
	138,059	$1,290,340

The great increase in the production of hard and refined (or gum) asphalt in 1906 over that of 1905, which amounted, in that year, to only 3036 short tons, is due chiefly to the new refinery development in Texas, although the production of this variety in California in 1906 (8178 short tons) is 100 per cent. in advance of the total for 1905.

In the production of oil asphalt California stands almost alone, producing 62,361 short tons of the total quantity and showing a substantial increase over the production for 1905. A very small output is reported from Texas.

About two-thirds of the asphalt imported into the United States comes from the island of Trinidad, off the coast of Venezuela. The pitch lake from which the asphalt is derived is about 100 acres in area and stands about 138 ft. above the sea. The asphalt forming the lake is from 18 to 78 ft. thick. The early reports described the material near the middle of the lake as being warm and soft, but now the asphalt is sufficiently firm to support teams at any point long enough to permit loading.

Platinum Amalgam

A note in the *Am. Journ. Sci.* (June, 1907) gives some interesting facts concerning platinum amalgam. It is well known that when mercury is shaken up with water, the two liquids separate as soon as the agitation is stopped. Moissan has observed that it is otherwise when the mercury contains platinum in solution. After a few seconds of agitation the platinum amalagam forms a semi-solid mass of buttery consistency with a volume about five times as great as that of the original amalgam. The emulsion thus formed is so permanent that it does not appear to have changed its volume after standing at rest for a year. It resists the action of heat, for it may be heated to 100 deg. C. without apparently changing its volume, and without any disengagement of gas. When the emulsion is subjected to a vacuum it diminishes in volume, a little water separates, and bubbles of gas are given off. The emulsion may be made by shaking 2 c.c. of distilled water to which has been added a few drops of 10 per cent. solution of platinic chloride.

Proposed German Export Duty on Coal

According to London *Engineering* (Aug. 30, 1907), the present dearth of coal in Germany has caused a demand in certain quarters for an export duty on coal, while at the same time the bitterness against the coal syndicate manifests itself in various ways. The tactics of the syndicates are being vehemently denounced, and it is freely suggested that they charge such excessive prices within the country to make up for the losses their unwise foreign trading has entailed. The export duty would probably not be put at more than one mark per ton; and there are not a few who are of opinion that the syndicate might be able to make the home consumer pay this duty, and who, instead, recommend a reduction of the railway rates for coal imported from abroad. The position of the Prussian State as owner of coal mines has also to be reckoned with. The Landtag is distinctly in favor of, first and foremost, guarding the interests of the State by keeping up the high prices for coal, and not demoralizing the market by facilitating the import of foreign coal through a reduction of the railway rates. Something, however, is likely to be done, and it remains to be seen whether an export duty or a reduction of railway rates will be decided upon.

It is estimated that the amount of platinum scrap which returns to the market for use again is 30 to 35 per cent. of the whole consumption.

Characteristics of Some Mexican Mining Regions

Discussion of Relationships between Geographic Features and Economic Resources in Chihuahua, Sonora and Western Sierra Madre

BY ROBERT T. HILL*

At first thought one is hardly inclined to believe that the classification of geographic provinces can have much relation to mining, but inasmuch as in all the territory south of the glaciated limit the economic conditions of such industries as mining, agriculture, transportation, etc., are largely conformable to well defined geographic units, which in turn are dependent upon geologic conditions, I hope to show quite an intimacy between the two subjects.

The Great Plains province, which covers an immense area in seven of our States and Territories, may be taken as an instance. The student of the distribution and possible occurrence of our economic minerals can draw a line around this vast country and set down the fact that no metallic minerals do or can occur there, for the geologic facts are absolutely against such a condition. Any reputable engineer would tell to a client bringing a metallic mine from this province that his project was worthless, simply because it is obvious that such a thing is an impossibility.

On the other hand, any proposition from the Sonoran, the Rocky Mountain, the Chihuahuan, or the Nevadan provinces is always worthy of at least a respectful hearing, because we know that the conditions exist in these provinces for profitable mineral occurrence.

Two-fold Aspect of the North American Continent

In general the continent is divisible into greater subdivisions known as "regions," and the regions in turn into provinces and these provinces into countries and districts. In many cases the smallest of these subdivisions, the country or the district, occupies a vast area, and of itself constitutes a great natural economic unit. Thus the Nevadan country of the Sonoran province of the Cordilleran region is of itself a unique and distinct country.

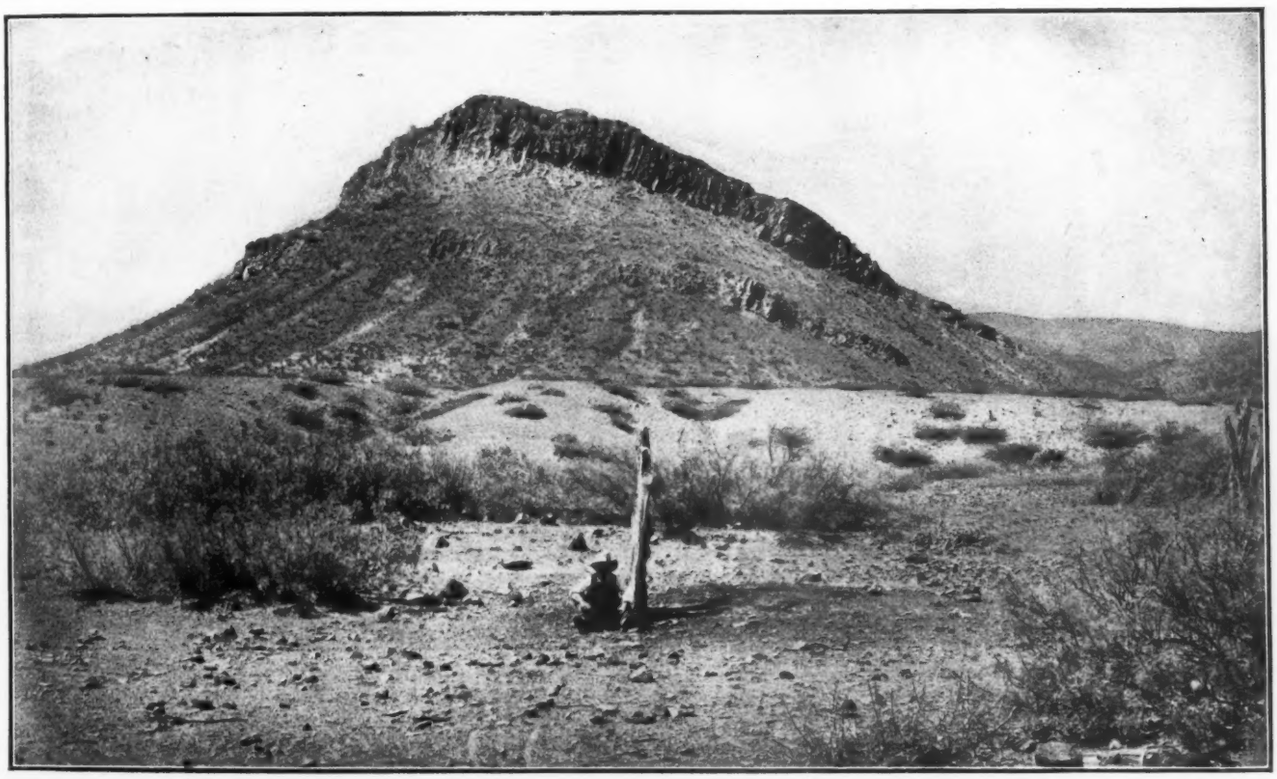
The two greater regions, in which the continent is divisible, are known as the Appalachian and Cordilleran. Each of these is attended by a vast area of bordering plains—The Atlantic Coastal plain, extending along the foot of the Appalachians from Jersey City to Vera Cruz, Mexico, and the Great Plains, extending along the eastern margin of the North American cordilleras from nearly the Arctic circle to the Rio Grande.

These two great regions are each peculiar and differ from one another in every natural aspect, geologic composition. structure, age and product. In fact in very late geologic time—the Upper Cretaceous period—they were almost distinct continents, separated by a great arm of the Atlantic Ocean, which was a northwestern extension of the Gulf of Mexico.

The vast Cordilleran region of itself, from Alaska to the Isthmus of Tehuantepec, in turn presents many distinct provinces, including the Rocky mountains, the Colorado plateau, the Mexican plateau, the Sonoran province, the Sierra Nevada and the Coastal Range (Pacific) province of California.

Distinguishing Characteristics

Each of the provinces and districts is



TYPICAL "BUFA," OR LOST MOUNTAIN OF THE CHIHUAHUAN DESERT (WEATHERED RHYOLITE)

(Photographed by Robt. T. Hill)

*Mining geologist, 25 Broad street, New York.

sui generis—a country to itself with great geological, floral, ethnologic and climatic differences—and above all, of special interest to mining men—each has its distinct type of ore occurrence as has been found out at a sad cost by the so-called "practical miner" who, when he goes from his familiar province into another invariably finds himself confused with unfamiliar conditions. The old California miner, for instance, familiar with the great fissure veins of the Sierra Nevada. has often "turned down" the vast irregular bodies of the Chihuahuan and Sonoran provinces.

Localities and typical areas of these provinces are familiar to every reader, but strange to say their limitations and boundaries cannot be found correctly delineated upon any atlas, nor are they definitely known to anyone. In fact, it is doubtful if any professor of geology in the country could state correctly the location of the southern end of the Rocky mountains, the limitations of the Colorado plateau, the boundaries and extent of the great Chihuahuan and Sonoran deserts, or of the great western Sierra Madre of Mexico. That these vast provinces with their cities and towns, their mines and railroads, are not even diagrammatically recorded on our maps is a sad reflection upon our governmental explorations, our geographical societies, and our general intelligence.

Mines have been opened, railways built, and thousands of persons passing daily see great features like mountains and deserts, which are not even recorded or named on any map. If the reader who is familiar with Arizona, New Mexico, Trans-Pecos Texas, or old Mexico, will recall the fact, he will remember that he can never find a map that "shows the country." I have for many years tried to secure the removal from the Land Office map of the United States, the United States Geological Survey map of the United States, and the Official State Railway Commission map of Texas certain mythical mountains which never existed in nature, and to have placed upon those maps certain of the larger ones which are always omitted.

Geographic and Economic Provinces

Along the southern belt of our Cordilleran country in the States and Territories of California, Arizona, New Mexico, Trans-Pecos Texas, and the northern tier of the States of Mexico, 10 of these distinct geographic and economic provinces are sharply differentiated and defined in nature. These are the Pacific Mountain province (Coast and Sierra Nevada ranges), the Sonoran province (Nevadan Mojavan, Arizonian, Sonoran, and Sinaloan countries), the Colorado Plateau province, the Rocky Mountain province, the Chihuahuan Desert province, the Western Sierra Madre province, the Eastern Sierra Madre province, the Great Plains province and the Atlantic Coastal Plains province.

It is not my intention in the present article to describe each of these great features, but merely in a rambling manner to call attention to some of their salient characters and points of difference, and to endeavor to arouse some interest among the ever traveling and intelligent mining man in assisting in bringing about a more correct knowledge of their boundaries.

The Chihuahuan Desert Province

Many years ago I called attention to the fact that there were two distinct American deserts, which I named the Chihuahuan and Sonoran deserts respectivtly—names which scientists have since generally accepted. The great Chihuahuan Desert province surmounts the Mexican plateau. Perhaps many readers have crossed this province from east to west on the Southern Pacific Railway from Haymond, Texas, to Stein's Pass, N. M., and traveled its longer north-south direction between Santa Fe, N. M., and Queretaro, Mexico; and yet the large map which I have recently completed is the first attempt so far as I am aware to outline its boundaries and limitations as an entirety.

SUMMIT PENEPLAIN OF THE WESTERN SIERRA MADRE, CHIHUAHUA

(Photographed by E. O. Hovey)

Geologically the Chihuahuan Desert presents the simple type of islands of isolated mountain blocks surrounded by vast plains or "bolsons" of desert waste. The mountains are usually limestone or igneous rock, or both. North of the Rio Grande the limestones are mostly Paleozoic, south of that stream they are Cretaceous. Interesting features of this great desert province are its long arms,

extending northward in New Mexico, and the manner in which it is cut into three conspicuous districts by transversing groups of mountains.

Although all deserts may look alike to those who erroneously compare their clean rock powder, which fills the atmosphere, with the germ-laden dirt that blows about the city streets, each of these districts of the Chihuahuan Desert presents strong local differences of soil and economic features readily distinguishable to geographers.

The Rio Grande flows in a channel cut below the level of the Chihuahuan Desert for nearly a thousand miles between the Colorado line and the mouth of the Conchos, touching "bed rock" in only three or four places.

The valuable mines of this area are also peculiar. They are largely characterized by the irregular shape and varying contents of their orebodies. The latter in Mexico are usually in the Cretaceous limestones, and are of pockety, cavernous and blanket-shape replacement type, while the contents may be either silver, lead, zinc, or copper, occasionally carrying gold, or any two or more of these. Many of them, as at Santa Eulalia, Almoloya, Mapami, Naica and Sierra Mojada are of such size as to put them in value well ahead of most mines of the "true fissure vein" type.

The Western Sierra Madre

This vast mountainous area dominates the Mexican plateau, except in the south, where it is in turn capped by the volcanic highland, and is absolutely different in its rocks, minerals and topography from the Chihuahuan and Sonoran provinces which inclose it. From a physiographic point of view, it is a vast area of circumdenudation—a higher island of summit survival. It is a remnant of the ancient cordilleran "peneplain"—or in plainer English, a fragment of the old surface of the cordilleran country as it was when it stood four or five thousand feet nearer sea level than now—and which has been restricted to its present area by a rapid continental uplift in more recent geologic time, resulting in destructive erosion of its borders.

There are other islands of highland like the Western Sierra standing here and there above the average cordilleran level, like the Colorado plateau, the Sacramento mountains of New Mexico, and the Davis and Chisos mountains of Texas, the tops of which all approximate eight thousand feet above sea level, and whose timbered tops are the collectors of the rainfall originating the peculiar "suicidal" or "lost" rivers of the arid region.

Rivers of this class are those which, starting copiously in the higher areas of humid timbered mountain tops, in their descent toward lower levels erode away the margins of the rain-collecting highlands which give them birth, and die through evaporation in their lower reaches upon the deserts which they also cover with debris. They were all once much longer than now, but have diminished as they destroyed their own water-sheds.

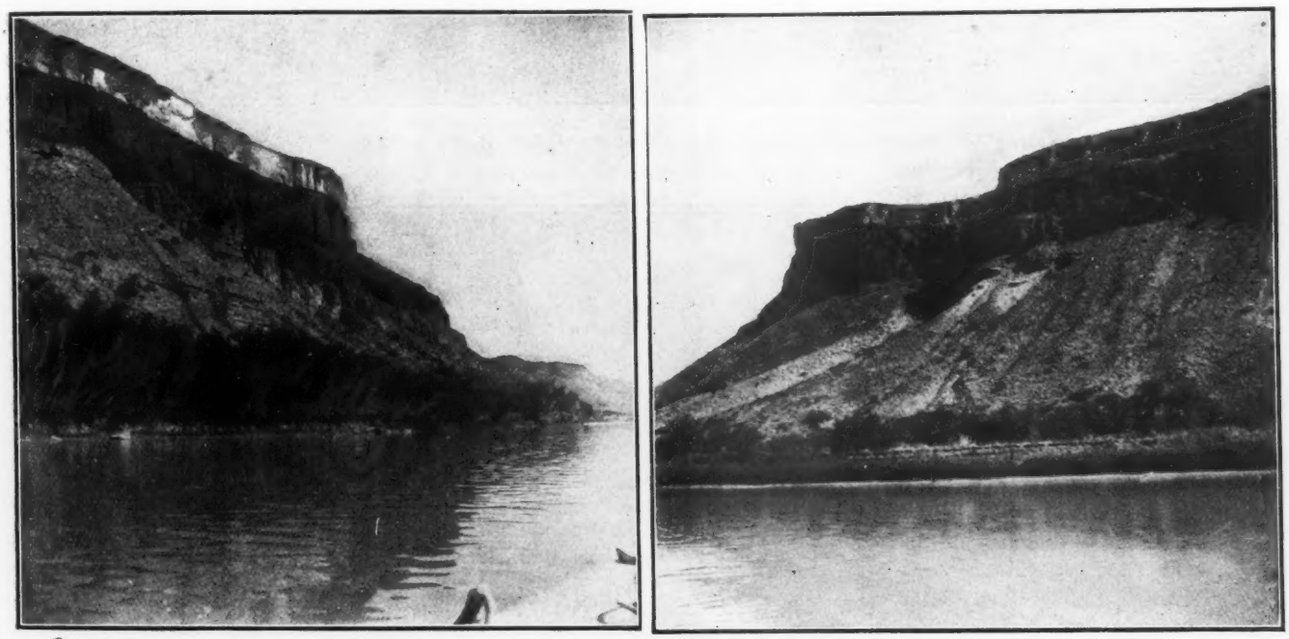
The edges of the Sierra Madre are ragged mountain scraps overlooking desert areas. Although mappable and well defined in nature in most places, there is hardly a portion of its boundary which has been definitely recorded or where exploration might not produce knowledge. A singular feature of this plateau is its sudden narrowing and termination at the United States boundary, although possibly represented even there by the Chiricahua range, connecting the Sierra Madre plateau with that of the Colorado plateau and dividing the Sonoran and Chihuahuan deserts.

Ore Deposits of the Sierra Madre

Our statesmen forefathers who defined the astronomic boundary between the United States and Mexico on a map in Washington long before any American had ever seen the country it traversed, drew wiser than they knew, for the last southward railroad pass across the Cordilleran region coincides with that line. In fact the southernmost trans-cordilleran road (Phelps, Dodge & Co.'s El Paso & Southern) is obliged to tunnel in one place to keep out of Mexico, while some 13 railways in Mexico have built toward the summit of the great Western Sierra, but not one has yet succeeded in crossing it or connecting the population of the Mexican plateau with the extensive Pacific Coast States.

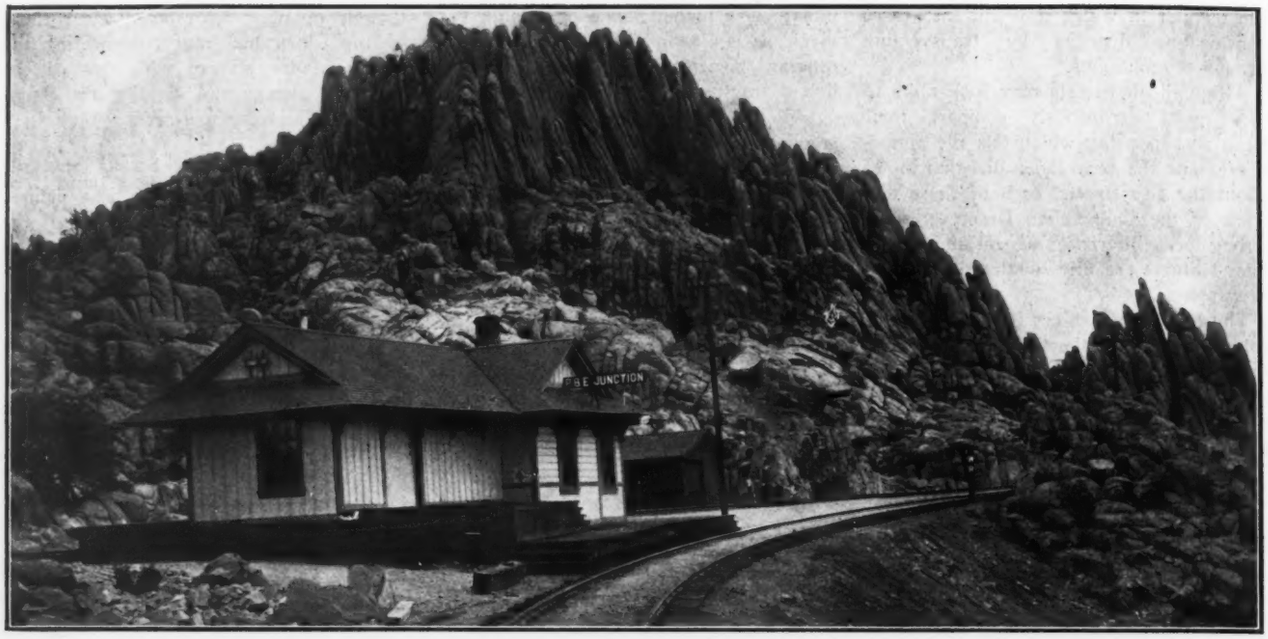
The Sierra Madre is likewise a distinct mineral province and its ore occurrence has a type quite different from the others, being an area of quartz fissure veins in a matrix of igneous rocks carrying mixed gold and silver values like the mines of Guadalupe y Calvo, Ocampo, Pinos Altos, Concheno, etc. It is an interesting fact that the mines of this type also occur in the volcanic highland to the southward at Pachuca, El Oro, Guanajuato, and elsewhere. Copper is rare and occurs nowhere in workable quantities in the western Sierra Madre.

The matrices of the veins likewise are usually of igneous rocks, limestone being absent or exceptional. Occasionally, how-

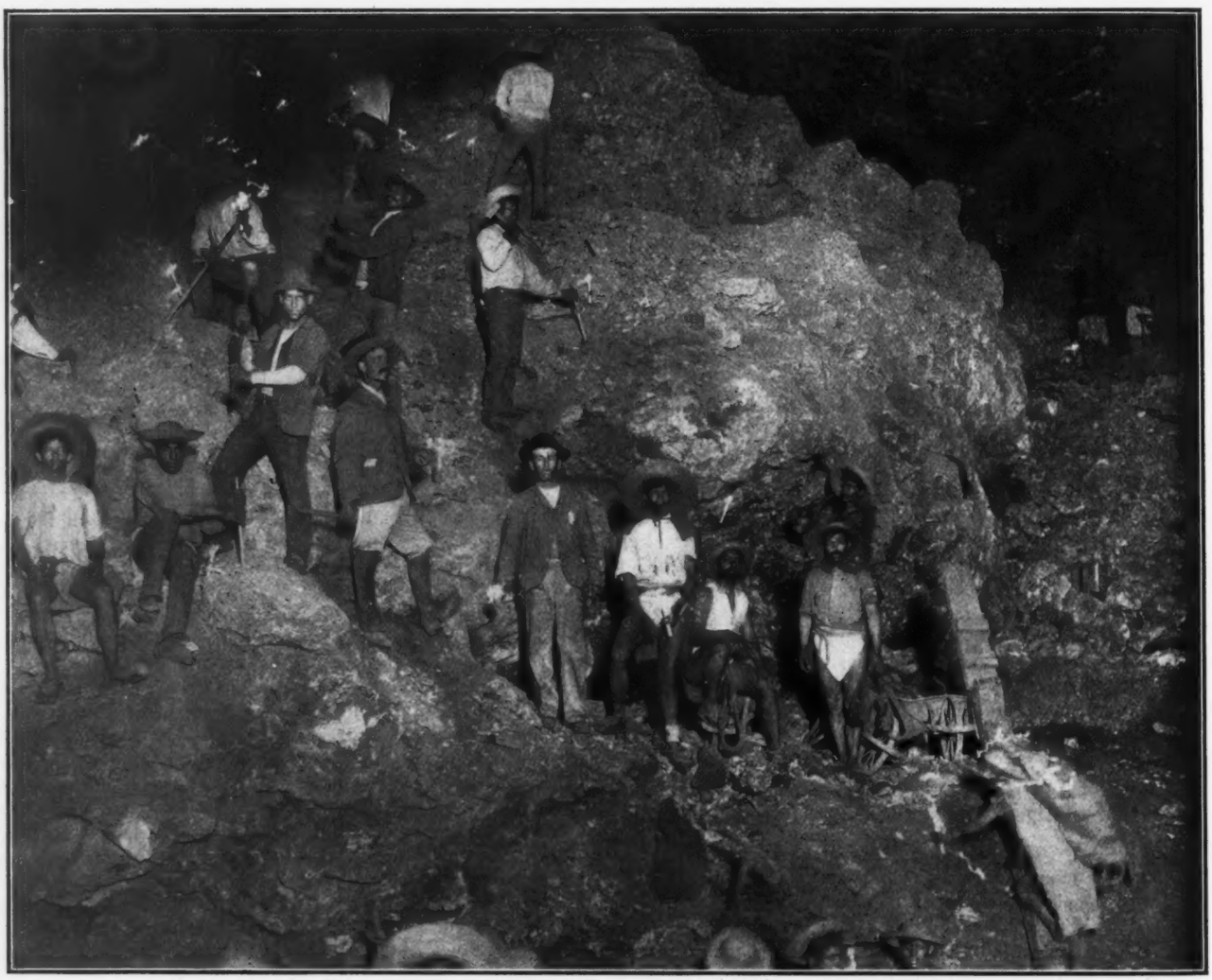


BLACK ROCK CANYON OF THE RIO GRANDE. BASALTIC DIKE BETWEEN LIMESTONES

(Photographed by Robt. T. Hill)

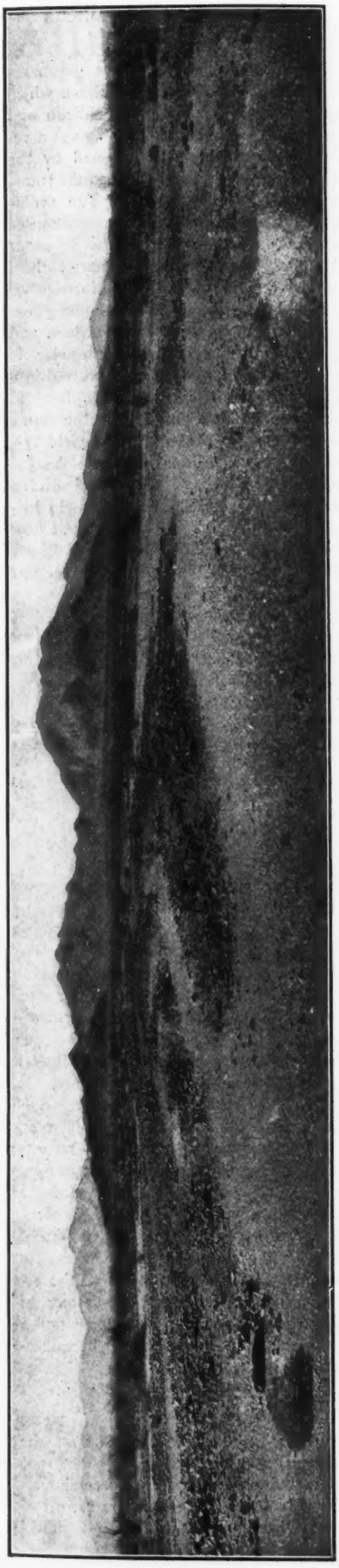


THE BREAKS OF THE COLORADO PLATEAU GRANITE, NEAR PRESCOTT, ARIZONA



AN IRREGULARLY SHAPED ORE BODY OF THE CHIHUAHUAN PROVINCE (ALMOLOYA MINE)

(Photographed by Harris, Chihuahua)



THE SONORAN DESERT, SHOWING DECADENT MOUNTAINS AND ROCK WASTE OF DESERT PLAINS, EASTERN CALIFORNIA

ever, in the deep cañons cut nearly a mile below the summit of the Sierra the same limestones which constitute the mountains of the surrounding desert provinces, are revealed below the eruptives. Like wise from evidence I have in hand, it is presumable that the rocks and topography of the Sierra Madre once extended far eastward over the Chihuahuan plateau and have since been removed by erosion.

The Colorado Plateau

This vast area extending from the Rio Grande in the northern half of New Mexico to the Colorado of the West and through which the Grand Cañon of the Colorado cuts such a magnificent section of nearly a mile in thickness of horizontal sedimentary strata is another distinct geographic unit with its peculiar geologic characters, which has not had its boundaries mapped.

The top country is a vast area of plains conforming to the equally horizontal beds of limestone and sandstone constituting the material of the plateau, which stretches over thousands of monotonous square miles. The southern edge of the plateau breaks off suddenly as the cliff of an escarpment variously known as the Black Mountain mesa, the Mogollon mesa and the White River mountains, overlooking a vast belt of the foot-hill country and the great Sonoran and Chihuahuan deserts to the south. The term foot-hill country is a misnomer, however, for the eminences and valleys accompanying this great declivity comprise a belt of mountains of vast size.

The Southern Edge of the Plateau

This southern edge or "break" extends between the Great Bend of the Colorado at the corner of Utah, Nevada and Arizona, to the north of Silver City, in New Mexico, for a distance of 600 miles. It is a great rugged declivity of from two to five thousand feet from the summit of the plateau to the average desert level of the Sonoran and Chihuahuan provinces on the south and west. One can sail half way around the world and not find two more entirely different countries than those at the top and base of this plateau, in northern and southern Arizona respectively. This transition is most radical.

No geographer or geologist has as yet attempted the reconnaisance as a whole of these gigantic features and they cannot be as yet correctly delineated upon any map. What a magnificent field of study it constitutes for some young man with strength and health who wishes to gain honors in exploration! The United States Geological Survey could do no better work for science than to run a series of quadrangles across this scarp and no young man with an ambition for exploration could find a more fertile and original field of study than to traverse this phenomenon from end to end.

It is my belief, however, that some day it will be discovered that a great structural line, or tectonic zone, running in a northwest-southeast direction dominates this condition. Adjacent to such a line and conforming with it between Nevada City, Nev., and Brownsville, Tex., the reader will find some of the most unexplained features of our continent, including the southern edge of the Colorado plateau as above described; the sudden terminus of the Paleozoic rocks of North America at the Mexican line, as seen in Mount Franklin at El Paso (which is perhaps the most beautiful section of the Paleozoics in the Cordilleran region, the mountain looking southward across the great plateau of Mexico, upon which for thousands of miles, until the vicinity of Tehuantepec is encountered, no more Paleozoic rocks are exposed beneath the great Cretaceous mantle); the course of the Rio Grande from El Paso southeast, with its wonderful cañon and plateau of the Santa Helena; the great faults of this plateau itself, which are direct evidences of structure in this direction; the course of the same river, after its northeast bend across the Eastern Sierras, a thousand-mile journey again in this southeast direction possibly following this tectonic course; and the northern ends and sudden termination of the many eastern sierras of Mexico in Coahuila and Tamaulipas, which are also aligned along such a northwest-southeast line.

The Colorado Plateau province likewise constitutes an individual mineral province, possessing no serious metallic wealth; nor would it be expected in such structure, although at its base many valuable districts are found as at Magdalena, Silver City, Clifton, Morenci and Globe. Such minerals as have been reported within the plateau proper, mostly copper, are in kidneys or lenses conformable to the stratification and always easily exhaustible.

The Sonoran Province

Of the great Sonoran Province, still another distinct type of country, a volume could be written, and I shall discuss it in a more extensive article. This vast province extends for 1700 miles through Nevada, Southern California, Arizona, Sonora and Sinaloa, and lies west of the great cordilleran highland known as the Colorado plateau, in the United States, and the Western Sierra Madre in Mexico.

In all, it is the most interesting country in its diversity of scenic aspects of mountain and desert; most valuable in its mining resources, especially in its production of copper and gold, and from every scientific aspect the most fascinating and least understood province of North America.

In a portion of the extension of this province into the United States its borders are partially and clearly defined by the great Sierra Nevada and the Colorado plateau, but as we travel southward to Arizona and Mexico, knowledge of its

former western border becomes absolutely deficient, for much of its area has either subsided or degraded below sea level in that direction. It is utterly impossible to obtain from any record or map an exact idea of where the Western Sierra Madre end and the Sonora province really begins; until more definite records are made, we may in general assume it to be the valley of the Rio Moctezuma.

This province is the real American desert, with a wide range of all the wonderful natural features known as "desert phenomena"—aridity, desiccation and other processes of the atmosphere, the scarcity of running streams, the adaption of vegetation to drouth, etc.

The Sonora province, like the Chihuahuan, is also a country of lost mountains and desert plains, but differs considerably in age of material and in arrangement.

THE HORIZONTAL ROCK SHEETS OF THE COLORADO PLATEAU, GRAND CANYON

In general, the Sonoran province physiographically is a degraded and faulted area of Paleozoic and Algonkian rocks and volcanoes, representing the former western extent of the great Colorado plateau and the plateau of the Western Sierra Madre.

The Mineral Resources of Sonora

Although some Triassic and Cretaceous strata occur, the limestones when found, as at Cananea, Sierra Ajo, Antimony and Caborca, are mostly Paleozoic—the Grand Cañon series resting on Algonquin schists or granites.

The Sonora province is rich and varied in its mineral resources and modes of occurrence. Gold (both in placers and in veins) and copper are its chief products, but silver, lead, antimony and other minerals occur. Coal is found in the Triassic rocks. There are also desert lakes of salt and soda. One of the chief types of mineral occurrence, however, is the great copper replacement and enrichment bodies in a geologic matrix of igneous rocks and limestone. These igneous rocks are usually rhyolitic quartz-porphyry, or some other form of acidic rock.

Today in this province in Utah, Arizona and Northern Mexico mines of this type are exceeding the world in the production of copper, and yet the type is absolutely undescribed in any work of resource. Furthermore, these mines are suggestively alined along a belt or strip of country which follows the eastern margin of the Sonoran province. The southern portion of this belt extends via Clifton, Morenci, Bisbee, Cananea, etc., as far south as Sinaloa.

The western half of the Sonoran belt is more abundantly productive of gold mines and quartz ledges in the older Paleozoic and Algonkian formations of the plateau group, or in silicified rhyolitic intrusions into them.

The mines of the Sonoran province embrace both the older and younger types of mineralization, which Lindgren has described. Surely a region of such wide diversity within itself, of such mineral and geologic resources, is worthy of an attempt of a study of its characteristics and essential features. Intelligent mining men every day are seeing geologic and geographic phenomena worthy of noting and record. Sketch maps and notes, if sent to some common place of preservation and compilation, would be of priceless value.

Danger from Ferro-silicon

It has been established that poisonous gases are given off by ferro-silicon which contains high percentages of silicon and the *Iron Age* (Sept. 19, 1907) gives a report of the memorandum issued by the British Home Office in regard to the transportation of this substance. The evolution of gas is due to the disintegration of ferro-silicon into powder by the action of moist air. The iron ore and quartz, which are reduced in the electric furnace to produce ferro-silicon, often contain phosphates, which, in presence of carbon, and at the high temperature of the electric furnace, would no doubt be converted into phosphides, combining with the lime to form calcium phosphide. In the same way any arsenic present would yield calcium arsenide. These would be decomposed in presence of water and evolve phosphoretted and arseniuretted hydrogen, both of which are poisonous. The explosion occasionally reported, of ferro-silicon in transit, is less easily explained and several theories have been put forward. It is believed that if moisture is carefully excluded from the casks or drums in which ferro-silicon is packed no danger need be feared.

Petroleum in Rumania in 1906

A brief review of operations in the petroleum fields of Rumania is given in the *Mont.-Zeit.* (Aug. 15, 1907). In 1904 the total exports of petroleum and its derivatives amounted to 160,443 metric tons; in 1905 to 214,348 tons, and in 1906 to 321,119 tons. These increases are nearly all in illuminating oils and benzine, the exports of crude oil and distilled products having undergone only a nominal increase.

The countries to which large shipments were made and the percentage of the 1906 exports taken by each, are as follows: England, 28.5; France, 27; Germany, 11; Turkey, 7; Austria-Hungary, 5; Bulgaria, Servia and Norway 3 per cent. About 77 per cent. of the total exports was carried in Rumanian vessels. At present there are 16 wrought-iron storage tanks distributed among the shipping ports, their total capacity being about 80,000 tons. This amount is not sufficient to accommodate the rapid growth of the petroleum industry and in the summer of 1907 the construction of four new tanks, each of 5000 tons capacity, will be undertaken.

The average performance of steam shovels in the iron-ore deposits in the Mesabi Range, Minnesota, is about 900 cu.yd. per day of 10 hours. Three shovels together have made a maximum record of 190,000 cu.yd. in a month, a rate per shovel of 1218 cu.yd. in 10 hours.

Milling Practice at the Granadena Mill

The Ore from This Mexican Mine Is a Complex Mixture the Highest Value Being Found in the Finest Concentrates

BY S. F. SHAW*

The Granadeña mine is located about four miles from Santa Barbara, Chihuahua, Mexico, in which district are also located the Tecolotes mine of the American Smelters Securities Company, the Montezuma mines, belonging to the R. S. Towne interests, the San Francisco del Oro mine and others of lesser note. The ore from all of these properties is of much the same character, being a complex mixture of lead, iron, copper, and zinc sulphides carrying varying proportions of gold and silver, and requiring concentration to enable it to be handled by the smelters.

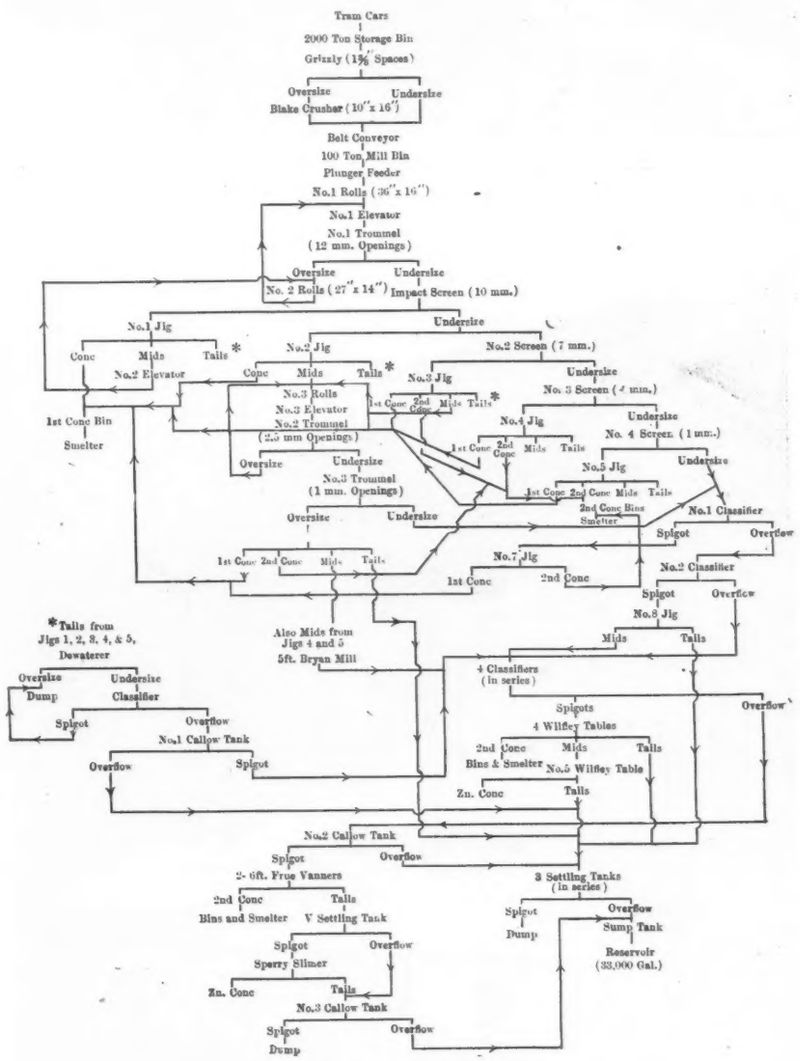
At the Granadeña mine the ore, delivered to the mill, averages about 8 grams Au, 200 grams Ag, 7 per cent. Pb, 1 per cent. Cu, 7 per cent. Fe, 11 per cent. Zn, 16 per cent. S and 50 per cent. SiO_2. This ore is to be sorted before hoisting as soon as the new shaft arrangements have been completed. The silver is distributed through the ore in such amount that each per cent. of lead, iron, zinc, and silica carries 13, 11, 2, and 1 gram silver respectively. The gold has no such distribution. With such a combination, milling operations are conducted so as to save as much lead and iron as possible, throwing out zinc and silica as a waste product or as a product to be treated for the zinc which it contains. Owing to the blende being so finely distributed through the sulphides it is found impossible to make a high-grade lead product with a low zinc content without considerable loss of lead and silver.

Method of Treatment

The ore is delivered by cars of 2 tons capacity to the mill bin from which it is drawn over a grizzly, having 1⅜-in. openings, into a 10x16-in. Blake crusher set to crush to 1½ in. The crushed ore joins the fines from the grizzly, falling on a belt conveyer which delivers to a 100-ton bin. It is then fed by a plunger feeder to a set of 36x6-in. (No. 1—See accompanying flow-sheet) rolls set ½-in. apart and falls into No. 1 elevator by which it is delivered to a hexagonal (No. 1) trommel having 12-mm. punched round openings. The oversize from No. 1 trommel goes to a set of 27x14-in. (No. 2) rolls set ⅛ in. apart and falls into No. 1 elevator.

The undersize from No. 1 trommel goes to a set of four impact screens making five products sized as follows: 12-10 mm.; 10-7 mm.; 7-4 mm.; 4-1 mm.; and undersize from 1 mm. screen. The first three products go to jigs Nos. 1, 2, and 3, and the fourth product is divided between jigs Nos. 4, and 5. Each jig has four compartments, the side discharge and the hutch from the first compartment of each of the jigs being delivered by launder to the first-class concentrate bin. The side discharge and hutch from the second compartment of all jigs, excepting jigs Nos. 1 and 2 are delivered by launder to the second-class concentrate bin. The side discharges and hutches from the second, third, and fourth compartments of jig No. 1 go to No. 2 elevator and then to No. 2 rolls. The second, third and fourth compartments of jig No. 2 and the third and fourth compartments of jig No. 3 go to a set of 20x12-in. (No. 3) rolls set close together. The third and fourth compartments of jigs Nos. 4 and 5 deliver to a 5-ft. Bryan mill which crushes through a 12-mesh, double crimped, brass wire screen. All tailings from jigs Nos. 1, 2, 3, and 4 go to a 12-mesh de-watering screen, the tailings falling on the dump, while the water, after flowing over a box classifier, to remove the coarse stuff, goes to No. 1 Callow cone settling tank.

A No. 3 elevator delivers the material from No. 3 rolls to No. 2 trommel having a 6-mesh screen, the oversize from which goes back to the No. 3 rolls, while the undersize goes to a 12-mesh No. 3 trommel, whose oversize goes to jig No.



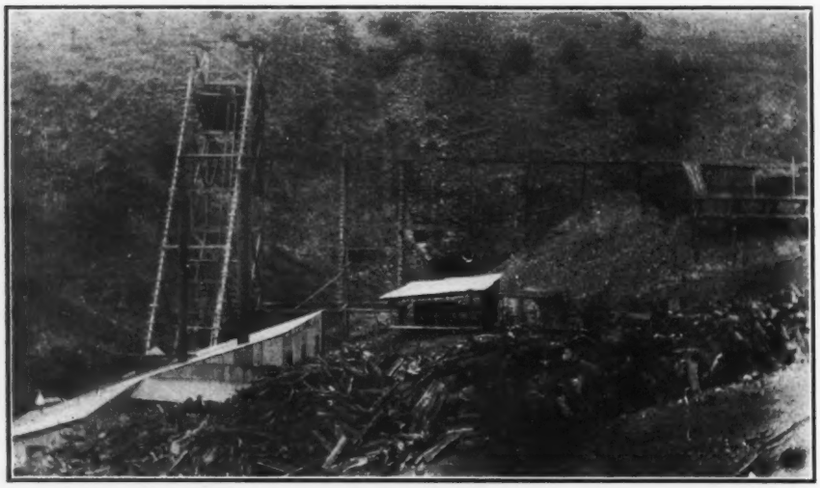
FLOW SHEET OF GRANADENA MILL

*Superintendent, Granadena Mining Company, Santa Barbara, Chihuahua, Mexico.

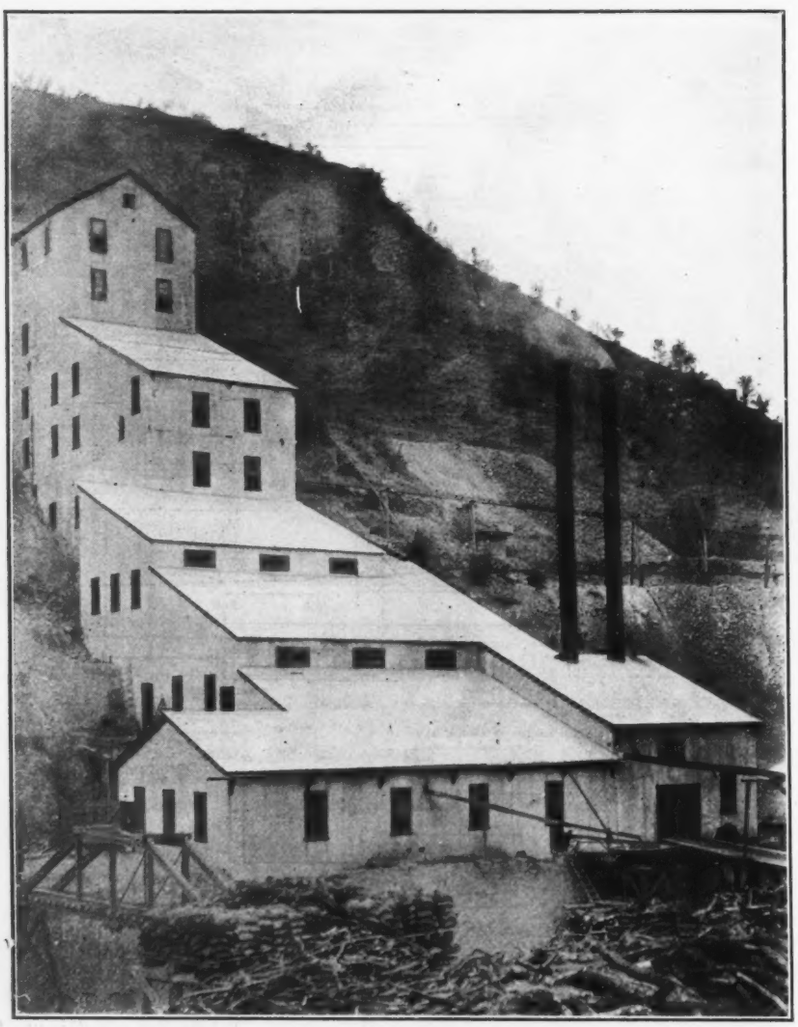
6, which makes and disposes of its products the same as jigs Nos. 4 and 5.

The undersize from the fourth impact screen joins the undersize from No. 3 trommel going to No. 1 Richards hydraulic classifier, the spigot delivering to jig No. 7, while the overflow goes to No. 2 Richards hydraulic classifier. The spigot from No. 2 classifier delivers to jig No. 8, the overflow going to No. 1 Callow tank.

Jigs Nos. 7 and 8 make the same kind of products. The first compartments yield first-class concentrates, the second compartments, second-class concentrates, while the products of the third and fourth compartments go to a set of four Richards hydraulic classifiers in series. The No. 1 Callow tank bottom discharge and the material from the Bryan mill also are delivered to this set of four classifiers. The spigots deliver to Wilfley tables Nos. 1, 2, 3, and 4, the overflow from the last or No. 6 classifier going to No. 2 Callow tank.



HEAD FRAME AND COMPRESSOR BUILDING, GRANADENA



GRANADENA MILL

Table Concentration

The four tables make second-class concentrates, middlings and tailings. The concentrates from the tables go to the concentrates bins, the middlings from Nos. 1, 2, and 3 tables go to a No. 5 Wilfley table, while the middlings from No. 4 table go to No. 2 Callow tank. No. 5 table makes a lead-iron product, a zinc product, and tailings. The tailings from jigs Nos. 5, 6, 7, and 8 join the tailings from the five tables and go to a set of three settling tanks. Also to these tanks flows the water from the overflow of No. 1 Callow tank.

The settled pulp from No. 2 Callow tank is delivered to two 6-ft. Frue vanners making second-class concentrates and tailings. The tailings flow to a V-settling tank from which the pulp goes to a Sperry slimer which makes a zinc concentrate and tailings. These tailings join the overflow from the V-settling tank and go to a No. 3 Callow tank. The settled tailings from No. 3 Callow tank fall into the dump while the clear overflow joins that from the three wooden tanks, flowing then to a sump tank from which it is pumped to the 33,000-gal. reservoir at the top of the mill by a 8x12x8½x10-in. Knowles compound steam pump. The tables, vanners and slimer draw their wash water from a small tank which receives the overflow from No. 1 Callow tank.

Water is very scarce in the district during the dry season, which makes necessary efficient settling arrangements. The loss of water is less than 10 per cent. of that flowing through the mill.

By careful attention to adjustments a salable zinc product is made on the No. 5 table and on the Sperry slimer.

Efficiency of the Mill Treatment

The efficiency of the treatment can be deduced from the following average assays:

	Au. Gm.	Ag. Gm.	Pb. %	Fe. %	Zn. %	SiO_2 %
Mill feed	8	200	7.0	7	11	50
Jig tailings	3	65	1.3	5	7	65
Table tailings	4	100	1.5	6	18	50
Vanner tailings	4	125	1.7	7	20	40
First-class concentrates	55	825	55.0	8	10	6
Second-class concent'es	20	400	20.0	15	18	10
Zinc concentrates	4	175	1.5	8	40	10

The capacity per 12-hour shift is about 100 tons.

Owing to the complex character of the ore, the results obtained appear to be the

best that can be secured with present facilities. Numerous sizing tests locate the higher values in the finest material, that is, finer than 20 mesh, and probably a greater saving will be secured by carefully sizing this fine product before treating it on the tables and vanners.

Power and Labor

Power is supplied by a 12x36-in. single cylinder Bates-Corliss engine, running at 100 r.p.m. which operates the crushers, rolls, screens, jigs, and Bryan mill. A 7x10-in. Erie engine runs the tables vanners and slimer. Two 80-h.p. boilers, using wood for fuel, supply the steam for engines and pumps. Light at night is furnished by one 11-kw. General Electric Company dynamo, operated by a 7x10-in. Erie engine.

The total labor to operate the mill is as follows: 2 crushermen; 3 screen boys; 3 jigmen; 2 rollmen; 2 tablemen; 2 tankmen; 2 concentratesmen; 1 oiler; 1 fireman; 2 engineers; 2 mechanics; and 1 carpenter. The total cost is about $110 per day. Wood costs $8 per cord with a consumption per shift of 9 cords. These costs, together with supplies, repairs and incidentals, bring the cost of milling to about $2.25 per ton, Mexican currency.

Tin Mining in the Federated Malay States

The following particulars of the tin mining industries of the Federated Malay States, taken from the annual report for 1906 of the Resident-General (Sir W. Taylor), were reproduced in the *Chem. Trade Journal* (Sept. 7, 1907).

The Senior Warden of Mines, in his report on the working of the Mines Department, states that the mining revenue derived from all sources was $10,588,824, as compared with $9,689,501 in 1905. Of the increase of $899,323 the export duty on tin is responsible for $787,169 and premiums on mining leases $102,049. This increased duty was collected from a smaller quantity than in the preceding year, the output for 1906 having receded to 816,786 piculs, a decrease as compared with the output of 1905 of 39,874 piculs. The decrease of 39,874 piculs was made up of 1540 piculs of block tin and 38,333 piculs of tin ore; the output of 816,786 piculs consisted of 306,748 piculs of block tin and 510,038 piculs of tin ore.

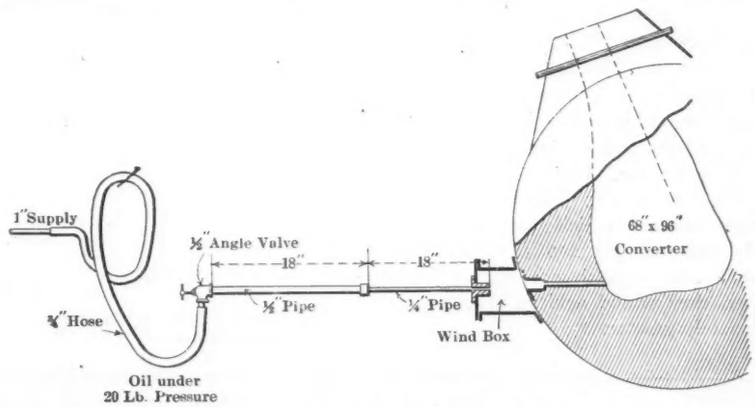
Rail fractures on the Union Pacific system totalled 449 in the month of February, 1907, according to a statement made at a meeting of the board of directors of the company on May 9. Of this total, about 40 per cent.—179 fractures—consisted of breaks in 90-lb. rails which had been in the track only five or six months.

Use of Crude Oil in Converters

By W. B. Rountree*

The following method in converter practice is now in successful operation at the works of the Mountain Copper Company at Martinez, Cal., and can be recommended as a more economical and effcient plan than the use of coal or wood in converter work. In bessemerizing a 35 to 40 per cent. matte in small converters (68x96in.), in order to develop heat in a charge that has run cold, or to prevent shooting and foaming of a fresh charge, fuel oil is used, which is delivered into the metal through one of the tuyere-holes.

The oil is conducted to behind each converter stand through a 1-in. pipe under pressure of about 20 lb., preheated by laying the pipe alongside the steam boilers. At suitable periods the oil is injected through the wind-box, and controlled by means of a valve. As the accompanying sketch shows, the burner proper consists simply of two lengths of pipe, 18 in. each, of ½ in. and ¼ in. diameter. It is of course not found necessary to atomize the oil. The same device is used for drying newly-lined converters.



METHOD OF INJECTING OIL INTO CONVERTERS

Sulphur in Russia

An article in the *Paint, Oil and Drug Review* (Aug. 28, 1907), gives a summary of sulphur-mining conditions in Russia. At various times Russia has erected small works for producing the sulphur, the largest being at Daghestan, in North Caucasus. Here the maximum production amounted to 1500 tons. The beds of Daghestan are extensive and have 20 per cent. of sulphur. Their geological character resembles that of the Sicilian beds, which only contain 14 to 17 per cent. of sulphur on an average.

The sulphur beds recently discovered in Transcaspia, Asiatic Russia, promise to be the second largest in the world. The beds are situated in the Ungus valley near Kirk-Choulba, 100 miles from Khiva, on the Amur, and 170 miles from Askhabad, on the Transcaspian Railroad. The sulphur is practically exposed. The gangue is sandstone and contains 60 per cent. of sulphur on the average. Shafts are unnecessary.

*Smelter superintendent, Mountain Copper Company, Martinez, Cal.

Carborundum Molds for Casting Aluminum

According to the *Brass World* (Aug. 1907), one of the recent uses for carborundum is in molds for casting aluminum. W. A. McAdams, who has taken out many patents upon the casting and working of aluminum, has now patented the use of carborundum for molds.

He appreciates the fact that aluminum, or any other metal for that matter, is rendered more dense when cast in a metal mold which conducts the heat away from the molten metal rapidly. Sand molds conduct the heat slowly and the castings made in them are coarsely crystalline. The inventor claims that carborundum conducts the heat away from the metal rapidly and gives a dense casting.

For the mold he uses a mixture of carborundum, finely powdered, and mixes it with sugar and a small quantity of clay. The following proportions are used: Carborundum, 10 lb.; sugar, 12 oz.; clay, 10 oz. The whole is mixed together with enough water to render the mass plastic, and then formed into molds. These molds are then baked.

Consul-General Hector de Castro, of Rome, reports that magnesite and magnesia clay deposits are found in northern Italy in the province of Turin. Italy produces annually about 1800 tons of sulphate of magnesium, 600 tons of calcined magnesia, and 625 tons of magnesite. The Kingdom exports some 850 tons of sulphate of magnesium and imports 950 tons of magnesium, exporting about one-half of the latter amount. The domestic production appears to suffice for the home consumption and is apt to be increased according to necessities.

Construction of Tracks in Coal Mines

Methods of Laying Tracks for Haulage Roads. Necessity of Greater Care in Construction. The Laying-out of Frogs, Switches, Etc.

BY M. S. HACHITA*

The construction of mine tracks is similar to that of surface tracks. One of the most costly equipments in the production of coal is the undeground haulage road and its maintenance. The amount of money spent in laying tracks in mines is in the aggregate immense. Take the entire anthracite field, for example, which contains about 320,000 acres and has about 66,667 miles of trackage per seam. We may consider that there are four workable seams over the entire field, or 266,668 miles of underground tracks. The amount required to build these roads was approximately $524,140,800. (See Tables I and II.)

More Attention Should be Given to Building Haulage Roads

The building of a breaker which may cost $100,000 is a matter to which mine superintendents and engineers give much thought and study. If they would devote as much attention to their underground haulage systems which cost (approximately $340,000 per 200 acres of four workable seams) much more than a single breaker, they would achieve results proportionately greater.

breasts, the solid lines represent gangway and airway tracks, and the double lines the mechanical haulage. The first column and seventh columns are respectively the length of rooms, gangways and mechanical roads per acre. The total track-

TABLE 1.

No. of Tract.	Total Area in Which Tracks Meas.	Total Length of Tracks in Breasts.	Total Length of Tracks in Gangways and Airways.	Total Length of Mechanical Haulage Road.	Length of Cham. or Breast Tracks Per Acre.	Length of Gangway and Airway Tracks Per Acre.	Length of Mech. Haulage Road Per Acre.
	Acres.	Feet.	Feet.	Feet.	Feet.	Feet.	Acres.
1	222	194,300	56,600	3,400	875	255	15
2	165	174,000	24,750	3,900	1054	150	24
3	122	118,000	18,000	200	966	148	2
4	250	180,000	45,000	1,700	720	180	7
Average.....					904	183	12

Total trackage per acre 1099 ft.

TABLE 2.

	16 Lb. Rails.	25 Lb. Rails.	40 Lb. Rails.	
1 mile steel rails.....	$880.00	$1296.43	$2137 15	
Spikes.....	44.50	73.92	98.49	
Splice-joints.....	85.68	107.10	124 95	
Cross-ties.....	396.00	528.00	660.00	
Laying track.....	500.00	600.00	700.00	
Total.....	$1,906.18	$2605.45	$3720.59	
Cost per acre of materials and labor.	904 ft. $326.36	183 ft. $90.30	12 ft. $8.45	= 1099 ft. } Per acre = $425.11 } per seam.

425.11 × 66,667 = $136,035,200 425.11 × 266,668 = $544,140,800

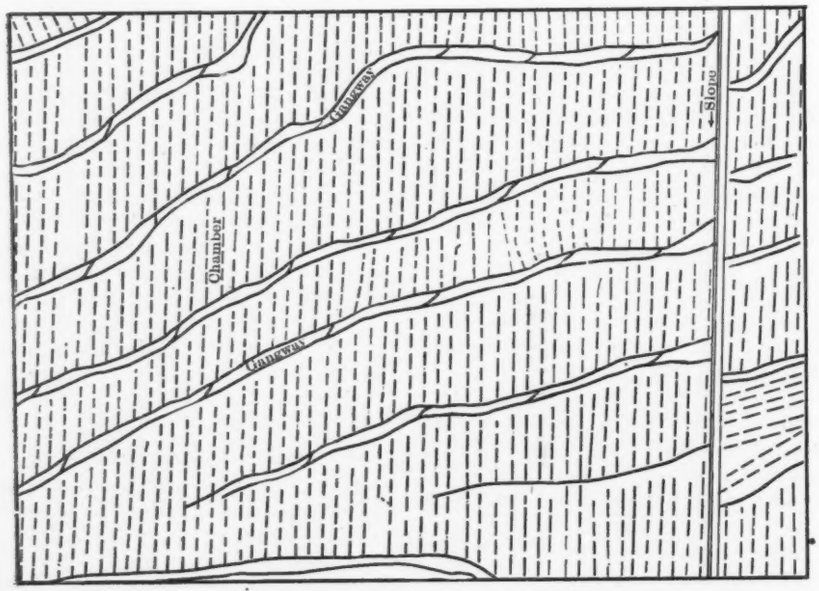


FIG. I. DISTRIBUTION OF MINE TRACKS

The general distribution of the underground tracks in a typical anthracite mine is shown in Fig. 1. The dotted lines represent the trackage in the chambers or

in Table I shows the area of the different tracts measured. The second column is the total length of room tracks; third column shows the total gangway and airway tracks; fourth column is the mechanical haulage tracks, while the fifth, sixth

age per acre of three combined lengths is 1099 feet.

Wooden Rails Better for Pitching Roads

On account of the heavy traffic and high speed of loaded cars on the mechanical haulage, 40-lb. rails are generally used on the road, while 25- and 16-lb. rails are used on the gangway and breast tracks respectively. In the breast, where the inclination of the road is considerable, wooden rails are sometimes used, as the friction offered by them is considerably more than that offered by iron rails, consequently they are better adapted to pitching roads. The wooden rails are cheaper than iron rails, but the life of the wooden rail is shorter. If the rails are exposed to dry mine air they last about 10 to 15 months before they become affected by dry rot. If the rails are subjected to alternate wet and dry, they only last from 5 to 8 months, while the same rails laid in wet roads will last longer than 15 months; much depends on local conditions. The dimensions of wooden rails are usually 3 x 5 in. x 12 ft. Such rails are commonly wedged in notched ties. The ties are so notched that when the rail is placed in position it is firmly held in place by wedges driven on the

*Engineer with Lehigh Valley Coal Company, Wilkes-Barre, Penn.

outside of the rail. Fig. 2 shows the sizes of notches, etc. For the curved part of the track at the foot of the breast iron rails are usually used for a one-rail length, then the track is continued with the wooden rails. The frog and turn-out at the foot are made of cast iron.

The grade of tracks is generally governed by the contour of the gangway and it has been the practice to adopt the grade best suited for the haulage of both loaded and empty cars, but since the gangway is driven up the grade sufficiently for drainage purposes, the grade commonly used is from 1 to 2 per cent. in favor of the load.

All tracks, especially those on main gangway roads, should be firmly laid on good sills, resting on the solid bottom of the gangways and should be ballasted with broken stones. The sills lying in depressions should be raised to the proper level by placing underneath them a few pieces of slate. On the main haulage, where the grade is uneven it is a common practice to grade the road before the permanent track is laid. To operate a haulage system economically, a uniform grade is absolutely necessary.

It has been generally recognized that a gage of track larger than 4 ft. and less than 2½ ft. is not economically operated on account of the limited underground space, and the stability of the mine cars. The gage most commonly adopted is 3 feet.

Method of Laying Track

In laying tracks for a straight road the ties should first be distributed and laid, equally spaced, and at right angles to the rail with the ends lined up along one side of the track so that the middle of the ties is in the center of the track.

Due care must be taken in laying ties on sills so that the faces of the ties will be a little lower than the elevation calls for, as it is easier to raise than to lower the track after it is laid. Four spikes should be used per tie. In locating spikes experience has shown that it is best to place them on the same side of the center of the tie with two spikes on the inner side of the rail and the other two on the outside of the rail (see Fig. 3). Driving the spike on the center of the tie should be avoided, as so doing will cause a tendency to split. The size of the ties depends on the weight of the rails used. For 16- to 20-lb. rails the ties should have a 4- to 5-in. face and a depth of from 4 to 5 in. and a length of 5½ ft. For a 36-in. gage (on a main haulage where 40-lb. rails are used), the ties should have a 5- to 6-in. face and a depth of from 5 to 5½ in. For 16- to 20-lb. rails the size of spikes should be 3½x⅜, and for 40-lb. rails 5x½ inches.

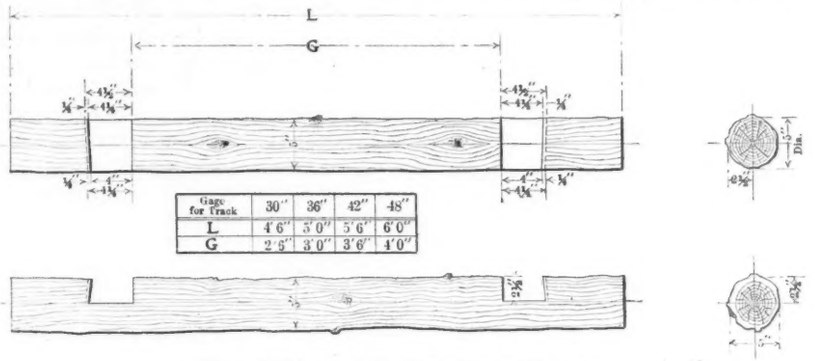


FIG. 2. NOTCH TIE FOR 3X5 INCH WOOD RAILS

TABLE 3.

Radius in Feet.	CM 5 ft.	CM 10 ft.	CM 15 ft.	CM 20 ft.	CM 25 ft.	CM 30 ft.	CM 35 ft.	CM 40 ft.	CM 45 ft.	CM 50 ft.
	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.
10	1,250	5,000	11,250	20,000						
15	0,833	3,330	7,500	13,330	20,834					
20	0,625	2,500	5,625	10,000	15,624	22,220				
25	0,500	2,000	4,500	8,000	12,500	18,000	24,500			
30	0,417	1,667	3,750	6,667	10,417	15,000	20,416	26,660		
35	0,357	1,430	3,214	5,710	8,928	12,857	17,500	22,860	28,930	
40	0,313	1,250	2,812	5,000	7,812	11,250	15,310	20,000	25,320	31,250
45	0,278	1,111	2,500	4,440	6,944	10,000	13,610	17,778	22,500	27,780
50	0,250	1,000	2,250	4,000	6,250	9,000	12,250	16,000	20,250	25,000
60	0,208	0,833	1,875	3,333	5,208	7,500	10,208	13,333	16,870	20,832
70	0,179	0,714	1,607	2,860	4,464	6,428	8,750	11,430	14,460	17,857
80	0,156	0,602	1,406	2,500	3,906	5,625	7,656	10,000	12,660	15,625
90	0,139	0,556	1,250	2,220	3,472	5,000	6,806	8,889	11,250	13,890
100	0,125	0,500	1,125	2,000	3,125	4,500	6,125	8,000	10,125	12,500
120	0,104	0,416	0,936	1,667	2,604	3,750	5,104	6,667	8,438	10,416
140	0,089	0,357	0,804	1,428	2,232	3,214	4,375	5,714	7,232	8,929
160	0,078	0,301	0,703	1,250	1,953	2,812	3,828	5,000	6,328	7,813
180	0,070	0,278	0,625	1,111	1,736	2,500	3,403	4,444	5,623	6,944
200	0,063	0,250	0,563	1,000	1,562	2,250	3,062	4,000	5,062	6,250

Weight of Rail

The weight of the rail used depends on the motive power and the capacity of the mine cars. For a 36-in. gage, mule haulage, with cars holding 1½ to 1¾ tons, the minimum weight of rail should be 16 lb. per yard, for cars holding from 2 to 2½ tons 20- to 25-lb. rails should be used, etc. But for mechanical haulage roads, such as slopes, planes, motor roads and tail-rope systems a 35- to 40-lb. rail is best. If the mine is wet the use of a light rail is not economical as the mine water always contains more or less acid which attacks the rails and makes it necessary to replace them more frequently than when a heavy rail is used.

It is advisable to use a heavy rail on curves in gangways as the wear and tear and strain are greater on the curves than on any other part of the track. As a car passes around a curve the natural tendency is to press the front wheel against the outside rail and the rear wheel against the inside rail, which greatly increases the resistance between the rails and the wheels and the cars are apt to be derailed from this cause. In order to remedy this evil, the usual practice is to increase the clearance between the rails and the wheel flanges. The amount of the increase in the gage depends on the wheel-base, the radius of the curve and the gage of the track. On an average this additional width is from ¼ to 1¼ in. On a sharp curve in a main haulage it is well to lay extra rails inside the outer rail and outside the inner rail to prevent the derailment of cars. Besides widening the gage on a curve, the outside rail should be raised for motor or locomotive haulage, while on rope haulage the reverse should be the case. The amount of elevation at a curve depends on the gage, the speed of a trip and the degree of curvature. For a 36-in. gage, with a speed of 10 miles an hour, the usual amount of elevation for various degrees of curve is as follows:

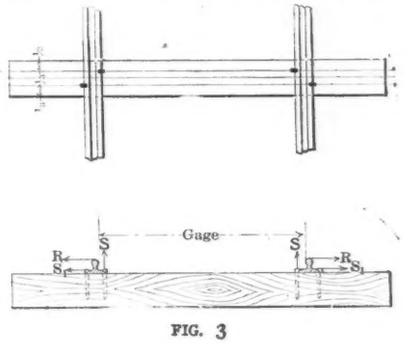


FIG. 3

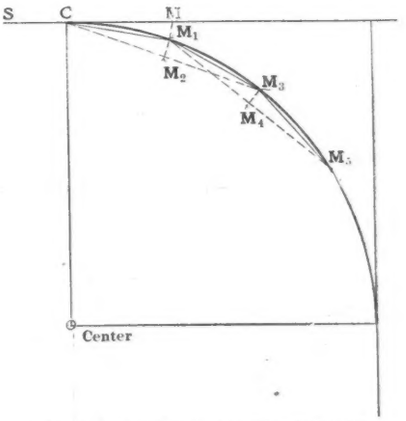


FIG. 5. GRAPHICAL METHOD USED IN LAYING CURVES

5	deg. elevation	0.25 in.
10	deg. elevation	0.35 in.
15	deg. elevation	0.50 in.
20	deg. elevation	0⅝ in.
40	deg. elevation	1⅜ in.
50	deg. elevation	1¾ in.
60	deg. elevation	2⅛ in.
70	deg. elevation	2½ in.
80	deg. elevation	2⅞ in.
90	deg. elevation	3⅜ in.

Of curves the broadest ends of the ties should be on the outside and the ties should be placed radially to the curve (See Fig. 4).

On a main haulage road turn-outs should be constructed at convenient places so as to pass the empty trips, the length of such turn-outs depends on the number of cars contained in the trip. The usual length is from 150 to 250 ft. The switches which are located at both ends may be either of the ordinary or the automatic type. The former is generally used in the anthracite field as particles of coal and dust are apt to give trouble by destroying the springs of the latter.

Tail-rope Haulage

In operating a tail-rope haulage the slope or plane ties should be protected by rollers upon which the main and tail ropes pass. The function of these rollers is self-evident, without them the ties would be cut in two, the wear, and frictional resistance on the rope would be greater and consequently the cost of repairs, material used, and the cost of operation would also be correspondingly greater. These rollers are made either of cast iron or wood, the latter is more generally used on tail-rope haulage.

Laying Out Curves

In laying out curves it is often necessary to re-survey the road so that the proper radius of the curve may be determined. The center of the curve can be marked on the roof, but such practice is sometimes too expensive, besides it delays the work of laying the track. The curve may be easily laid out on a road as follows: The line SC in Fig. 5, represents the center line of the straight track, C is the point where the curve is to begin, and produce SC to M so that the length CM may have a distance of 5, 10, 20 ft., etc., according to the radius of the curve. Beginning from point C with a taper or string of length CM as calculated on Table 3, measure the distance CM and mark point M. From M measure the offset MM, so that $CM = CM$. Mark point M as the center of the curve. From M, measure MM_2 equal to MM_1, so that CM_1 is equal to CM_2 and mark the point M_2. Then produce the line CM_2 to M_3 so that M_1M_3 is equal to CM_1 and mark the point M_3 as the center of the curve. From point M_3 lay out M_3M_4 equal to M_1M_2 and M_1M_4 equal to M_1M_3, and repeating the operation as above; the points on the curve may be staked out as $M_1M_3M_5$, etc., until a point is reached where the curve is to discontinue. In Table 3 the offset MM_1 is calculated according to the different lengths of CM and the radius of the curve. This method may be applied to any case.

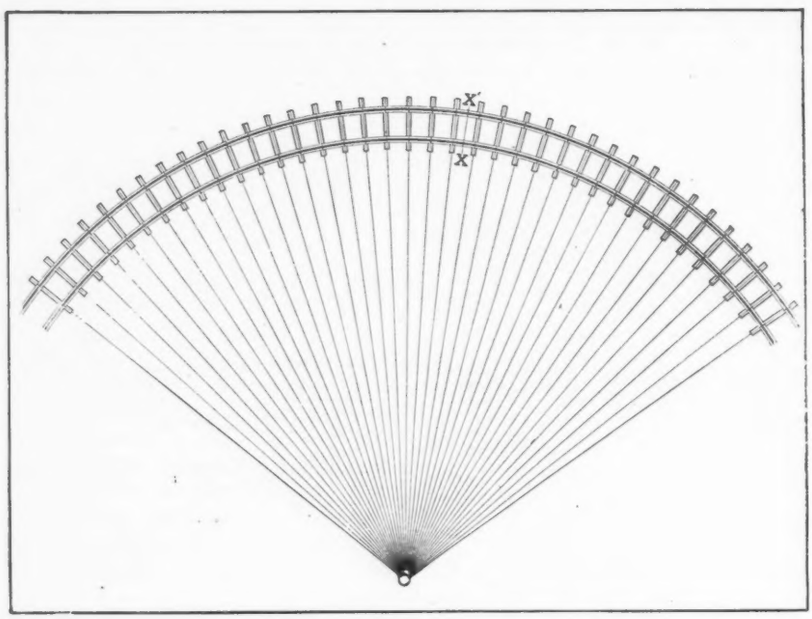


FIG. 4. METHOD OF LAYING TIES AT CURVES

TABLE 4.

Frog No.	Length of Point Lead.	Length of Stub Lead.*		Length of Moving Rail for 4 in. Throw.	Diagonal Dist. PF.		9 In. Mid. Ord. Dist. PB.		6¾ In. Quarter Dist. PA.	
	Feet.	Ft.	In.	Feet.	Ft.	In.	Ft.	In.	Ft.	In.
4	24	21	10	8	24	2	12	1	6	¼
5	30	27	3½	10	30	2	15	1	7	6½
6	36	32	9	12	36	2	18	1	9	¾
7	42	38	2½	14	42	1	21	1	10	6
8	48	43	8	16	48	1	24	1	12	½
9	54	49	1½	18	54	1	27	0	13	6
10	60	54	7	20	60	1	30	0	15	0

*3 inch throw.
NOTE: Length of moving rail = twice the frog No. in feet.

The frictional resistance to the passage of cars over curves is extremely variable, much depending upon the length of the wheel-base, the length of the radius of the curve, the amount of elevation of the outer rail, the speed and length of a trip, the length of the curved track, and the condition of the track and of the rolling stock. A general formula cannot be applied to any particular problem. A sharp curve at a steep grade should be avoided, as it greatly decreases the hauling power of mules or motor, besides increasing the operating cost and the cost of necessary repairs to the track and rolling stock. It is often preferable to increase the length of trackage rather than to lose continuously in the cost of operating and maintenance. When a curve comes on a grade, the practice is to reduce the grade on the curved part of the track so that the total resistance around the curve will not exceed the resistance of the straight part of the graded track. The usual compensation for the curves on a grade is 0.03 per cent. per one degree of curvature. For example, a 60-deg. curve, or 100-ft. radius comes on a 3-per cent. grade. The grade to be reduced at the curve $= 60 \times \frac{3}{100} = \frac{180}{100}$ or 1.8 per cent. The grade around the curve should be $3 - 1.8 = 1.2$ per cent.; that is, the 60-degree curved track having 1.2 per cent. inclination has the same resistance as the 3-per cent. grade on the straight track under the above stated conditions.

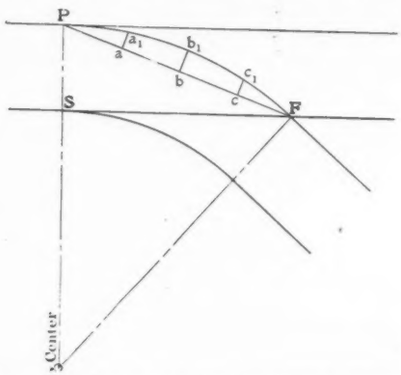


FIG. 6. METHOD OF LAYING TURNOUT CURVES

Turnout Curves

The turn-out from one track to another should be of the simplest type of all switch connections. The turn-out curve is usually an arc or circle, beginning at the point of the switch or head block (see

Fig. 6) and ending at the point of the frog F. The distance SF is known as the lead. Under no circumstances should the lead be guessed at. The value of the lead depends on the frog number, the gage of the track and the kind of switch throw. For mine tracks the following formula gives results sufficiently accurate for ordinary purposes. $L = 2\,F\,g$, in which L is the length of the lead for a point switch. F is the frog number, g is the gage. For example, if point F has been chosen for a 3-ft. gage with No. 4 frog, $L = 2 \times 4 \times 3 = 24$ ft. for the distance $F\,S$, the point lead. From careful results already obtained it is obvious that, when other things are the same, the length of the point lead is greater than the stub lead. (See Table 4.) The first column in Table 4 gives the frog numbers, in the second column are the lengths of the leads corresponding to the frog numbers. The third column contains the lengths of the stub lead. The fourth column gives the length of the moving rail used at the switch, the length is usually twice the frog number in feet; column 5 gives the diagonal distance $P\,F$ in Fig. 6, and columns 6 and 7 give the distance $P\,b$ and $P\,a$ respectively in Fig. 6.

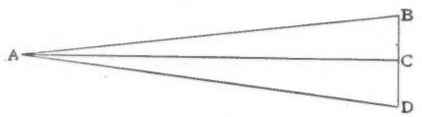


FIG. 8. FROG BOARD

In laying the curve from P to F the usual practice in a mine is to line the lead by the eye, but there is, however, another method by which the turn-out curve may be laid more easily and accurately than to lay it by the eye alone. In Fig. 6 the line $P\,F$ is diagonal distance as on Table 4; divide $P\,F$ into four equal parts at a, b and c, and by measuring the quarter and middle ordinates at a, b and c, the values of which are $a\,a$, $b\,b$, and $c\,c$, which latter equals $a\,a_1$ as found in Table 4; these lines should be measured at right angles to $P\,F$. The value of the $b\,b$ is usually equal to ⅛ the gage and that of $a\,a$ or quarter ordinate is equal to 3/16 that of the gage. The points a_1, b and c thus obtained are in the center of the curved track.

Cross-overs and Frogs

Cross-overs are made up of two single turn-outs facing in opposite directions and are connected between the frogs by means of a straight track. The first thing to be done in laying a cross-over is to fix the position of the first frog, then the location of the second frog can be found in various ways. In selecting the location of the first frog it is well to place the heel or toe of the frog at a joint so as to avoid cutting the rail. The location of the second frog depends upon the gage, the distance between the gage lines of the parallel tracks and the frog number. In general if F is the first frog that has been fixed (See Fig. 7), then the location of F can be found by the following formula:

$F\,P = (P - g)\ x - \frac{g}{\theta}$, in which x = cot. F, θ = sin. F, g = gage and P = the distanc between the centers of the two tracks. For example, if $P = 7$, $g = 3$, from Table 5 for frog No. 2, $\theta = 0.471$ and $x = 1.875$, then $F\,P = (7 - 3)\ 1.875 - \frac{3}{0.471} = 1.13$ ft.

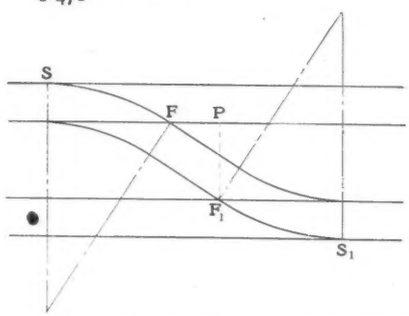


FIG. 7. METHOD USED IN LOCATING SECOND FROG POINT

TABLE 5.

Frog No.	Cot. F.	Sin. F.
1½	1.332	0.600
2	1.875	0.471
3	2.915	0.324
4	3.933	0.246
5	4.959	0.198
6	5.954	0.166
7	6.968	0.142
8	7.953	0.125
9	8.962	0.111
10	10.018	0.099

TABLE 6. FROG BOARD.

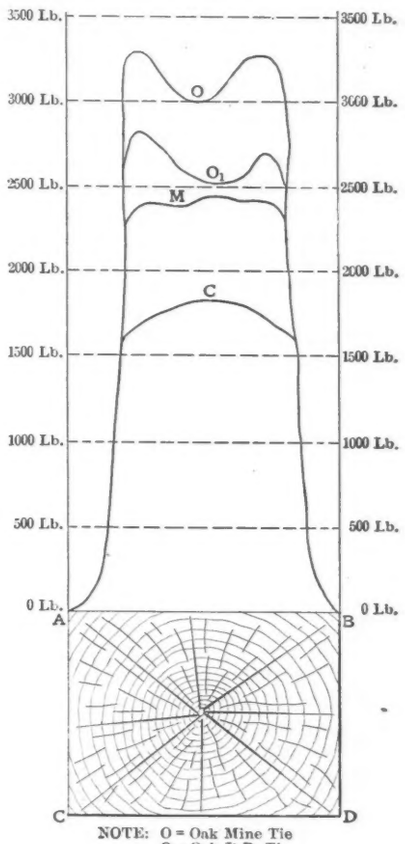
Frog No.	Length AC.		Width BD.
	Ft.	In.	In.
2	2	0	12
3	3	0	12
4	4	0	12
5	5	0	12
6	5	0	10
7	3	6	6
8	4	0	6
9	4	6	6
10	5	0	6

The second frog is at F, which is just opposite the point P. After the frog points have been located, the remainder of the work can be done by the method already mentioned. It must be remembered that moving rails, as found in Table 4, should always be spiked to not less than three cross ties and not less than 4 ft. from the end of the rail.

In laying cross-overs on curves there is no simple rule for the distance between the frog points on account of the wide difference in the curvature of the main track. When one is to be put in, one of the best methods is to set the frog by a frog board, in which case the alinement between frog-points may be curved or straight according to local conditions.

A frog board is a board sawed to represent the frog angle and is used to locate frogs by moving it along the rail until a proper location for the frog is found. Such a board is usually made of white pine or any other light wood, about 1 in. thick, 6 to 12 in. wide and 2 to 5 ft. long, according to the length of the frog from point to heel. Fig. 8 is a frog board and table 6 gives the dimensions necessary for making the board. To make a No. 3 board draw a line $A\,C$ through center of the board and measure exactly 3 ft. from A to C; measure $C\,B$ 6 in. at right angles to $A\,C$, and make $C\,D$ also 6 in. Draw lines from A to B and to D, and saw the board according to the directions of these lines; the angle of A is 18 deg. 55 min.

After having decided on the location of of the first frog at the curve, set it and lay



NOTE: O = Oak Mine Tie
O_1 = Oak R.R. Tie
M = Maple Mine Tie
C = Chestnut Mine Tie

FIG. 9

a full rail at its heel and connect it to the frog with a splice, then lay the rail in the exact line or angle of the frog and spike it down to hold it in line. Place the track gage normal to the rail and move it along the rail to the point at which the gage line of the other rail meets. This point thus found is the location of the point of the second frog.

Spikes and Ties on Curves

In laying tracks at the head and foot of the slope and plane the vertical curves should have a sufficiently large arc at the knuckle so that when the car passes over them it will rest on the rails with both front and back wheels. The radius of the vertical curve depends on the wheel

base. If the radius is too small, there is danger of the car jumping off the track.

The spike used on the inside of the rail is subjected to the pulling force while the spike used outside of the rail is subjected to the shearing stress. For these reasons the ties and spikes used at curves should be larger than those used for the straight road.

The holding power of the spike depends on its size and the kind of wood used for the ties. In this connection I made tests to determine the distribution and holding power of spikes in different kinds of wood. The result of the tests are shown in Fig. 9, in which *A B D C* is the end view of the tie, 6 x 5 in. x 4 ft. 6 in. The size of spike used is ½x4 in. In this test three different kind of ties were used, white oak, maple and chestnut. The curve *C* is obtained from chestnut, the greatest holding power was obtained at the middle and was almost 1800 lb. The curve *M* is obtained from maple, the distribution of holding power of the spike in this wood is very similar to that of chestnut. The maximum holding power for maple was 2400 lb. The curve *O* was obtained from oak and has a holding power of 3300 lb., the largest of the three. It will be noticed, however, that the distribution of the power in oak differs somewhat from either maple or chestnut. The maximum power was obtained at about one-third of the width from each end and the least power was obtained in the middle. The curve *O* was obtained from a regular oak railroad tie. It shows the same characteristics as *O* but has about 500 lb. less holding power than *O*, the same tie.

Oak Ties Should Be Used on Curves

The results thus obtained from these tests are in the nature of clues for future investigations. It is sufficient to say that the ties used around curves should be made of oak in order to get sufficient holding power for the spikes with the ordinary materials used in underground track construction.

Rails are a very important item in the construction of track. About 50 per cent. of all expenditure for track building is spent on rails alone. For this reason the selection of materials is just as important as the method of laying the rails. The end of the rail is the weakest part of the track and due regard has to be given to splicing the rails. When rails are fastened with splice bars, the space between the ends of the rails should be one-eighth of an inch apart to insure the expansion of the rails. The splice-bars should have elliptical holes to accommodate the expansion.

Before a mine road is abandoned the iron rails and the ties may be lifted from the road and used over again, thus the cost of materials required in the construction of tracks may be reduced, but it must be remembered that it requires labor to lift the iron. In some cases a mine rail may be used more than half a dozen times before it is out of service. In general the cost of material may be lowered but there is a proportionate increase in the cost of labor.

Table 2 shows that the cost of track per acre of coal per seam is $425.11. If a 4-ft. seam is to be mined the cost of the trackage per ton of coal mined is approximately ten cents, assuming 60 per cent. of the total coal is won.

Charging Shot Holes in Coal Mines

During 1906 there were in Great Britain 43 accidents in ramming or stemming the charge, causing seven deaths and injury to 60 persons. In ramming charges into a borehole there must always be some danger, and it cannot be too strongly urged that this operation should be carried out with the least possible exercise of force. There can be little doubt that in all these cases undue force was applied. The best method of preventing this class of accident is to insure that the men are not allowed to use drills which have become much worn, and also that the diameter of the cartridge is such as to give good clearance even with a slightly worn drill. The important thing to insure is that the cartridge shall not stick in the borehole, as if it does the miner is quite certain to use sufficient force to get it to the bottom of the hole, as to fire the charge half way down the hole would entail to him the loss of half his work. After the care which should be devoted to the drills, the other points which require attention are; first, to avoid bunching the cartridges, that is, tying two or three together or otherwise inserting several at the same time; second, the use of wooden rammers, and third, the thorough softening of all nitro-glycerine explosives before use. Even with all the above precautions, however, the use of undue force may always cause an accident. A general impression seems to exist that, at any rate in the case of gunpowder, no amount of ill treatment with wooden, or even copper tools, can possibly lead to danger, whereas, as a matter of fact, sufficient heat to ignite gunpowder may without much difficulty be produced by the contact of two particles of flint or other hard substance without the intervention of iron or steel.

Experience has shown that when sinking a shaft of moderate depth ventilation may be supplied by a fire burning in one corner. To clear smoke away quickly it has been found practical to burn a bundle of straw or shavings in one end of the shaft, and throw a bucket of water down the other. If the shaft is very deep or the sectional area small, ventilation can be produced by a steam jet or by a small fan run either by steam or by hand.

Tapping Water from Old Coal Workings

The old workings of the Brilliant Stockholm mine of Australia were recently drained of water by the following method: A new vertical shaft was sunk to cut the seam some distance below the old workings. This shaft passed through the seam in solid country at a vertical depth of 525 ft. The nearest point to the old workings was 100 ft. or more away. At about 440 ft. from the surface in the new shaft a 1⅞-in. hole was put in for 40 ft. The boring rods were withdrawn and 15 ft. of the hole enlarged to 2 in. and a 2-in. pipe fitted with a gate valve and pressure gage forced into the hole and securely held in place by cement. The rods were passed through this pipe and the boring continued. The old workings were tapped at a distance of 117 ft.

Because of the great pressure exerted against the boring rods after tapping, they had to be removed in short lengths. The rods removed, the gate valves were closed and connection was made between the horizontal pipe in the hole and the shaft column, a 3-in. pipe. When the valve was opened the water rose 400 ft. in the shaft column and the gage showed a pressure of 180 lb. per sq.in. A 1-in. pipe, which was connected on the surface with the main air pipes and fitted with a jet at the lower end, was passed down the shaft column and by an almost incredibly small amount of air the water was steadily removed. As the water receded in the shaft column the inch air pipe was lengthened from the surface, thus the breaking of the water column from time to time was avoided. The work was completed in 10 days. This method was not found expensive, the boring of the 117-ft. hole costing only $725.

Run-of-mine coal has been used successfully in the Chicago pumping stations, where formerly it was the practice to employ only lump coal which was supposed to have passed over 1¼-in. screens at the mines so that all pieces under that size were screened out before shipment. This made the coal more expensive, but theoretically it should evaporate more water per pound. By using run-of-mine instead of lump coal the average price was cut down from $2.55 in 1905 to $2.38 in 1906. In 1905 it required at all pumping stations 15.97 lb. of coal to pump 1,000,000 gal. to a hight of 1 ft., while in 1906 it required but 15.026 lb. for the same duty, or 0.498 lb. less than in 1905. The total cost of pumping 1,000,000 gal. 1 ft. high in 1906 was 3.89c., while in 1905 it was 4.25c., showing a saving of 0.36c. Of this amount 0.25c. was due to saving in coal and 0.11c. to saving in other respects. The Municipal Division of Tests and Inspection is making the tests.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

In case of emergency, pumps that will not respond to the usual method of priming by water may be primed with ordinary mine car oil. This is not advised for general use as the oil is apt to have a bad effect on the valves, but used once it does not materially affect them.

The experience of drivers has shown that a green mule ought not to be worked over three hours per day until he is accustomed to work in the mines. He should be placed next to the leader, and not in the breeching where he is apt to injure himself. He should not be over-loaded at first and above all things he should be treated with kindness.

It has been estimated that the average loss from breakage on anthracite coal discharged from cars into storage pockets is for all sizes, in the East, 2 per cent.; for example, on coal selling at $6 per ton the loss by breakage is estimated to be 12c. per ton. In the West the loss by breakage is estimated to be from 8½ to 9 per cent. This difference is due to the fact that in the West the coal is rescreened to separate the sizes while this is not done in the East. If coal is dropped into a hopper directly under the car and the fall is small the loss is 0.5 per cent.

The shrinkage of cement varies with the fineness or coarseness of the ingredients, the amount of water used in the mixing and the rapidity of settling. Fine material used very wet and settling rapidly gives the greatest amount of shrinkage. Experience has shown that when concrete is to be used to finish accurately to a definite level, an allowance of ⅛ in. or 3/16 in. per foot in hight, for vertical shrinkage, should be made. However, great care must be taken so as not to exceed the desired level, as it is much easier to increase the hight than it is to shave off a fraction of an inch.

Experiments have shown that the safest oils for use in safety lamps are rape-seed oil, colza oil, cabbage-seed oil, and seal oil; the last affords a better light than the vegetable oils and when used there is less charring of the wick. One part of coal oil, to two parts of rape or seal oil is safe and improves the light but the smoke of the flame is increased. Coal oil or a mixture of coal oil and lard oil has been used with success. Naphtha or benzine has been found safe under all conditions; even when the oil vessel of the burning lamp has been heated to 180 deg. F. and the light then extinguished no dangerous results have followed.

During recent years great strides have been made in the treatment of anthracite coal in England. This has been brought about by the development of the foreign trade and the use of special stoves, necessitating the sizing of the coal to suit the different markets. Formerly anthracite was used in comparatively small quantities, the large coal mostly for hop drying and malting, and the smaller sizes for heating hot houses, etc. In the South Wales district the small sizes are mixed with clay and formed in "balls" which are burnt in nearly all the cottages in Carmarthen, Pembroke, and Cardigan. It is no uncommon sight to see a woman outside her cottage mixing and treading with her feet the clay and coal. The "balls" will burn for many hours and are used in common grates of wrought iron.

Safety lamps for general use should be safe in strong air currents, should have good illuminating power, and security of lock fastening (they should be so locked that any tampering on the part of the miner will be detected at once in the lamp room). They should have freedom from flaming, security against accidents and simplicity of construction, so that they may be thoroughly and rapidly cleaned. Lamps for testing should be able to draw air from points close to the roof, should have free admission of air below the flame, no reflecting surfaces behind the flame, and the ability to test for a thin layer of gas near the roof. One of the most important features of a testing lamp is its uniformity of flame. Alcohol gives a more uniform flame than the lard oil which is generally used in safety lamps.

The experience of model washery plants has shown that there is no excuse for the dust and dirt found in the average plant. It has been demonstrated that cleanliness and comfort are possible if the following suggestions are observed. A washery plant should be located on a hill side in order that gravity may be used in handling the coal and the first cost greatly lessened. The coal should be crushed in the tipple, then elevated to the receiving coal bins of the washery plant. These bins should be in the top of the plant, or at least at some point above the washing machinery, and they should be so constructed as to prevent the sifting of coal dust into the washery room. No dry coal will ever enter the wash rooms if the coal is sluiced from the bins to the washing machinery, hence the room can be kept clean and the machinery in good order. The wash room should be heated by steam coils, the steam furnished by the exhaust steam from the engine and should be kept at from 40 to 50 deg. F. as the men will do more careful work and take better care of the machinery if they are comfortable. The saving resulting from the additional care which is apt to be given the machinery will pay for the slight cost of heating.

The experience of mechanical engineers has demonstrated the fact that a fire-brick arch springing over the grate in boilers immediately in front of the first section of tubes gives added efficiency to the boiler, as it absorbs the heat generated by the fire and thus becomes a radiating surface with exactly the same functions as the roof of a reverberatory furnace. It heats the air which is admitted when the furnace doors are opened, thus greatly prolonging the life of the boiler by preventing the contact of cold air with the tubes which is apt to produce sudden contraction and expansion leading to crystallization. It ignites, by radiation, new fuel as it is fed upon the grate and thus prevents the chilling of the fire and helps to maintain a more nearly uniform temperature of the gases passing from the furnace to the tubes. It also insures an even distribution of gases because the fall away of the arch from the center to the sides, prevents the concentration of gases at any one point.

Stable bosses have decided that the most suitable food for mules is oats, corn and hay. Of these, oats are the most nutritious. The age, size and amount of work required of a mule must determine the amount of food required. The average quantity per day for an average mule is 14 to 15 lb. of first quality hay and 12 lb. of corn and oats mixed in equal parts. Give a working mule all his system craves. Once a week a bran mash made of equal parts of bran and oats should be given as a gentle purgative. Twice a week all mules should be salted. When not working the feed should be reduced about one-third, if the animal is in good condition. The feeding should be water, hay and oats in the order named. If this order is followed digestion will be aided and if neglected digestion will be retarded. For instance, water if given after the grain is taken will wash the contents of the stomach into the intestines before digestion has occurred. If feed is left over from a meal it should be removed before another feeding. This is a sure sign that less should be given the next time. Hard labor cannot be performed on a too full stomach and hence the heavy feeding should be done at night and the light feed given in the morning.

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The Drought in Mexico

According to consular reports and other advices, the drought in the northern part of Mexico has been worse this year than since 1892. The disastrous effect of a shortage of water upon some branches of the mining industry is, of course, quite obvious; but not so obvious to those who are not well acquainted with Mexican conditions is the indirect effect of a drought upon mining through agriculture. However, this will be perfectly clear when it is pointed out that the chief subsistence of the inhabitants of Mexico is corn and beans, which are grown comparatively near, and never very far from, the locality of consumption. It is not merely the people who have to be considered, but also the animals, because in most parts of Mexico transportation is still done chiefly with the aid of mules and burros, and at many places the motive power for the *malacate* is still the mule. Consequently, a shortage of corn in these districts of Mexico is equivalent to a shortage of coal in the United States.

We remember how in the last bad famine in Mexico, that of 1892, the mine-mules had to be fed in the corrals under armed guards to prevent the people from stealing the corn that had been measured out to them. This was pitiful, for the people were half-starved, but unless the mules could be kept in proper condition, the *malacates* could not be worked, the miner could not be employed underground, wages could not be paid, and things would have been worse than they were. At that time, the Government of the State of Durango imported corn from the United States, and we saw men, women and children picking out of the dust of the road kernels of corn that had dropped from the government wagons. About 1000 people were fed daily by the city of Durango.

The drought this year has been due to the failure of the usual rainy season to materialize. The lack of rain-fall has been disastrous, not only to the crops, but also to the cattle, many of which have died. The few showers that have fallen have afforded only temporary relief. It is expected that the crops of corn and beans will be only one-fourth to one-half the usual harvest. The crop failure is also causing serious financial trouble, the banks being obliged to carry the farmers over to the next year, which leads to stringency in the money markets. Even the mining industry does not escape from disturbance, but in general, especially in the districts which have railway communication, the effect is rather beneficial than otherwise, because the failure of the crops makes more labor available for mining, and the high prices for food compel the people to go to the places where wages are paid. It is anticipated, consequently, that this will lead directly to greater activity in mining in the Republic and an increase in the mineral production.

Ely and Ely City

An amusing dispute between the big companies and the townspeople of Ely, Nev., has been going on for some time back. Ely was one of the old towns of Nevada, whose mines had never amounted to much, and for many years it rested in a quiet somnolence, isolated from the activity of the bustling West (Eureka, the nearest railway point being 90 miles away) and seldom heard of in the outside world. Then the big deposits of copper ore were developed, Ely became the cynosure of many eyes, and since last winter, its residents, who previously had been obliged to suffer the tedious stage journey to Eureka, have enjoyed the luxury of entrance and exit in a Pullman car.

Ely lies right at the mouth of Robinson cañon, so the railway extension to the mines was built through one of the back streets of the town. It did not seem that the railway would do any harm there or would be considered otherwise than as an inestimable boon by the people who for 30 years or more had possessed no railway at all. However, the town soon made demands of the railway, to which the latter decided it could not accede. It does not matter much just what the dispute was about, but it concerned something respecting the operation of trains which the railway company deemed onerous and objectionable.

The upshot of the matter was that the railway company answered that if the town did not want the trains to go through it, another line would be built above the town (which has since been done), but it said moreover that inasmuch as it appeared that old Ely did not care much for its affections, it would transfer its interests to a younger charmer, which had in the meanwhile grown up to the east of Ely under the nurturing of some enter-

prising boomers. The new town was rather absurdly called "Ely City." (It seems impossible to get away from this abominable suffix "city" until a place acquires at least 100,000 inhabitants, and as between Ely and Ely City, we should have thought the Postoffice Department would have had something to say; even East Ely would not have displayed such poverty of imagination as pretentious "Ely City," and anyway one wonders why the people who wanted to sell town lots could not have hitched on to the outskirts of the old town and been satisfied with "Ely").

However, the railway company did what it said it would, and established its freight depot at Ely City, since when the merchants of Ely have had to pay cartage for two miles to their town. The citizens of Ely have now gone to law with the railway company to compel it to construct and maintain a freight depot in the real town of Ely. It is said, moreover, that suit will be brought against the railway company to restrain it from using the name "Ely" on its new depot at "Ely City," which certainly was adding insult to injury. If respectable old Ely cannot peaceably and undividedly enjoy its own name, then what is in a name anyhow? Certainly the citizens of Ely ought to have a freight depot; more certainly still they ought to have full and unqualified possession of their own name; finally, Ely City ought to be called Monzonite, Coppertown, or something that is sonorous and not previously preëmpted in the Postoffice Guide. Yet, it is to be hoped that the townspeople, after their victory, will be generous enough to let the railway company run trains through the back street if it wants to, and not require it to eliminate grade crossings.

Zinc Ore Production at Joplin

The basis price for blende containing 60 per cent. zinc at Joplin on Sept. 21 was $40 per ton. The price had been gradually falling to that figure for several weeks, and for the first time since mining and milling of the "sheet ground" began to be productive on a large scale, we have had a test of the accuracy of the estimates that concentrate could not profitably be produced from such ground when the price realized is as low as $40 per ton. Of course, these estimates were to a certain extent relative, because the profits in this class of mining are dependent not only upon the yield and price of zinc concentrate, but also upon the yield and price of galena. The recent test was particularly severe, because the price for galena has fallen heavily along with the price for blende.

It appears that the estimates were correct to a large extent. Several of the "sheet ground" mines had to be closed as temporarily unprofitable, and consequently there was a natural diminution of the output of the district, besides the restriction of production by agreement among the operators. The production of the district for the first 38 weeks of 1907 averaged 5830 tons per week, while the production for the week ending Sept. 21 was 4556 tons. In the meanwhile the smelters have been suffering equally with the miners, because with ore at $40 and spelter at 5c. per lb., there is obviously no margin for profit in smelting. It is gratifying all around that the market for spelter and zinc ore have improved during the last fortnight, relieving the pinch that had be come uncomfortable.

The Need of a Mining Population

State Mine Inspector J. W. Paul, of West Virginia, after a tour of the mines of the State, complains that the standard of fitness is perhaps lower among miners in that State than in any other region of equal mining importance. In his opinion, the coal mines under his supervision need better miners rather than more men. He calls attention to the large number of destructive mine disasters which have occurred in West Virginia of late, and recommends that efforts should be made to secure 20,000 additional miners of a class which would give the State a "standard of production equal to her resources."

The inspector deplores the fact that his State, unlike Pennsylvania and other communities, has no mining population with the accumulated traditions and aptitude derived from long generations of mining ancestors. In the absence of better material the operators have been compelled to use the cheapest kind of labor and the result has been a low state of efficiency among the rank and file, while competent foremen have not been developed. It is reported that the State commissioner of immigration is in Europe and that he is offering the miners of several countries inducements to bring their experience to West Virginia. Incidentally this is an interesting reflection upon the alien labor law.

It takes time to make a miner, and nearly all newly opened districts are confronted with the same problem. Usually it has been possible to get the proper quality by paying the necessary price, but recently the demand has been so keen that the supply has not been sufficient to go around. No doubt in time West Virginia will develop its own efficient mining population as has every other region where an extensive mining industry deserves to flourish. In the meantime there seems to be only one remedy, i.e., to pay the higher price.

THE DIFFICULTY OF moving the large tonnage of ore from the porphyry mines of Bingham, Utah, to the concentrating mills at Garfield, which has been discussed as so serious an obstacle to the operation of those mines, has promise of an early solution. It has been recognized that the prospective trouble was only in the shortage of cars and motive power. It appears now that the Rio Grande Western has arranged to put 20 new locomotives and 500 new cars in the service, delivery of which has already been begun. Consequently there is no likelihood of delay in putting the Utah and Boston mills in full operation on this account The delay is far more likely to be due to the condition of the copper market, or perhaps rather the money market, inasmuch as both these companies have their concentrates smelted and refined on toll, and thus have their refined copper on their hands to dispose of, which may make them less anxious to begin opera tions at full capacity than otherwise they might be.

THE PROTRACTED NEGOTIATIONS on the steel rail question seem to be drawing to an end. The joint committee, including representatives of the larger railroads and of the rail-making companies has, it is understood, substantially agreed upon a modification of the larger standard rail sections, which will increase their weight about 10 per cent., the additional metal to be chiefly in the web of the rail. There will also be an increase in the proportion of the ingots discarded, to provide against flaws.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

Barometric Pressure and Colliery Explosions

The recent editorial in the JOURNAL on "Mine Explosions from Atmospheric Pressure" makes very interesting reading, and recalls to my mind the following item, which appeared in the *Medical Record* of 1876 (p. 374):

"Fire-Damp and the Barometer—It is maintained by French savants that an explosion of fire-damp can be predicted 36 hours in advance by a fall in the barometer, and a warning signal service is suggested in France."

Aside from its historical interest, the item is of value as suggesting how easily valuable discoveries may be ignored, simply because they are not brought to public attention in the proper manner. It would be interesting to know whether standard works on meteorology contain any reference to this subject, or, in other words, whether the matter has ever received extended consideration. It is self-evident, in view of the various articles which you have printed upon the subject, that barometric observations should be made at every coal mine considered more or less liable to gas explosions. It is a subject which the Weather Bureau might well take into consideration as perhaps one of the most practical directions in which its efforts could be extended. As you very properly observe, "it is only from a widespread understanding that the greatest benefit will be derived," and it is hoped that before long the available material on these subjects will be brought together.

F. L. HOFFMAN,
Statistician Prudential Insurance Company.

Newark, N. J., Sept. 25, 1907.

The Curtailment of Production at Joplin

In the JOURNAL of Sept. 21, 1907, p. 572, the Joplin correspondent says: "The output has been restricted approximately 15 per cent. by the closing of mines that cannot operate at a profit with lead so low as now and by mines closing down for repairs that could conveniently be given attention at this time."

The fact is that the curtailment of production has amounted to, roughly, 50 per cent. of the entire output. I inclose a clipping from the Joplin *Daily Globe* of Sept. 23, giving the views of different operators on this point. The statement of your correspondent is distinctly incorrect.

FRANK NICHOLSON.

Joplin, Mo., Sept. 24, 1907.

The clipping inclosed with the above letter shows that there is a difference of opinion among the Joplin operators as to the extent of the recent curtailment of production. It is difficult to compute precise statistics upon that point. The statistics of Joplin ore output which are published in the JOURNAL in a condensed form (by districts) are published in the Joplin *Daily Globe* in great detail (by mines), and any inaccuracies are open to detection. These statistics represent shipments, not production. In a brief period of time production may fall off largely and shipments only a little until surplus stocks have been disposed of. This is evidently what has happened recently. Our Joplin correspondent referred to the reduction in shipments—actually about 15 per cent.—which has been misunderstood by his use of the rather vague word "output." The shipments from Joplin in the 36 weeks ending with Sept. 7 were 211,985 tons, an average of 5,888 tons per week. The shipments in the week ending Sept. 14 were 4995 tons, which was just 15 per cent. less than the previous average.

Our Joplin correspondent adds the following under date of Sept. 30: "My computation of output for the eight months ending Aug. 31 averaged 25,732 tons per month. The September output was 17,840 tons, a decrease of 7892 tons. Add to this a decrease in stocks of 1390 tons during the month, the total restriction appears to be 9282 tons. The statistics of the Laryon Zinc Company show the average monthly output for the first eight months of the year to have been 26,218 tons, with an output in September of 18,513 tons, a decrease of 7705 tons. Adding to this a decrease in stocks of 594 tons during September gives a curtailment of 8299 tons, which is nearly 1000 tons less than my figure. The producers estimated a reduction of 12,000 tons in output and a decrease of 4000 tons in stocks, but their estimates were based upon the capacity of the mills shut down, without reference to the average output of these mills."

Location of Petroleum Lands

1. What do you consider the status of a placer mineral filing for oil?

2. Does the filing give a possessory right, or is a discovery necessary?

3. Do you consider that the $100 assessment work per year on roads, etc., without actual discovery of oil, appropriates the surface to the exclusion of bona fide locators?

4. It has been customary in some cases to form groups of placer locations in quarter sections and do assessment work of $100 on the entire 160 acres. Do you consider that this will hold?

J. L.

Ventura, Cal., August 7.

1. Any person authorized to enter lands under the mining laws of the United States may enter and obtain patents to lands containing petroleum or other mineral oils, and chiefly valuable therefor, under the provisions of the laws relating to placer mineral claims. (Act of Congress approved February 11, 1897.)

2. According to the above, discovery is necessary.

3. Unless there be actual discovery of valuable deposits which would entitle a placer location to be made, no location can legally be made.

4. Where oil lands are located as placer mining claims, the annual assessment labor upon such claims may be done upon any one of a group of claims lying contiguous and owned by the same person or corporation, not exceeding five claims in all; provided, that said labor will tend to the development or to determine the oil-bearing character of such contiguous claims. (Act of Congress approved February 12, 1903.)

The Jamestown Exposition

Through the courteous coöperation of Dr. Joseph Hyde Pratt, chief of the division of mines and metallurgy, headquarters have been established at the south entrance of the Mines building for the use of members of the institute and their guests visiting the Exposition. Conveniences for writing and posting letters, etc., have been provided; and arrangements have been made for the prompt delivery of mail-matter, addressed in care of Dr. J. H. Pratt, Mines building, Jamestown Exposition, Va.

Having recently spent more than a week at Jamestown, in the capacity of a juror of awards, division of mines and metallurgy, I wish to assure the members of the institute, nothwithstanding the conflicting and sometimes discouraging reports of newspaper correspondents, that the Exposition is well worth a visit, even from those who remember Chicago, Buf-

falo, St. Louis and Portland. Its smaller area will be to many an additional attraction; its pleasing colonial architecture has a distinctive charm, not derived by mere imitation from previous examples; and, above all, the mineral exhibits in the Mines building are so varied and so interesting as almost to warrant a journey on their sole account.

JOSEPH STRUTHERS,
Assistant Secretary,
American Inst. of Min. Eng.

New York, Sept. 23, 1907.

Filing Clippings

I have seen several comments in late numbers of the JOURNAL on saving clippings. I have recently purchased a scrapbook which seems to me to fill the bill better than letter-files, filing envelops or anything else.

In this book the paste is arranged in vertical rows of spots about ⅛ in. in diameter and ⅛ in. apart. There are six rows of paste, so that each page will hold six columns of clippings, which may be read on both sides.

To insert a clipping wet a row of spots and press the edge of the clipping on them. The pages are large enough to hold a page of the ENGINEERING AND MINING JOURNAL by clipping the edges. These books have an index in front. I suppose they can be bought at any large book store.

EVANS W. BUSKETT.

Depue, Ill., Sept. 20, 1907.

The American Electrochemical Society

The program for the fall meeting of this society, to be held in New York, Oct. 17-19, has been provisionally arranged. The headquarters for registration and the place for meeting will be at the rooms of the Chemists' Club, No. 108 West 55th street. The hotel headquarters will be at the Hotel Cumberland, Broadway and 54th street. The program, as announced, is as follows:

On Thursday, Oct. 17, the directors will meet in the morning. In the evening there will be a reception at the Chemists' Club, followed by two lectures; one by Dr. George F. Kunz on "The Diamond and Moissanite," the other by E. G. Acheson on "Deflocculated Graphite."

On Friday, Oct. 18, there will be a session in the morning for reading and discussion of papers. The afternoon will be devoted to an excursion to the laboratories of Thomas A. Edison, and the evening to the annual dinner.

On Saturday morning, Oct. 19, there will be a meeting at Columbia University for the reading and discussion of papers. In the afternoon members will visit the Pennsylvania Railroad power plant at Long Island City. In the evening the meeting will close with a smoker tendered the association by the Chemists' Club.

The chairmen of the local committees are as follows: Executive, S. A. Tucker; entertainment, G. Drobegg; press, E. F. Roeber; excursion, C. F. Baskerville; reception, C. O. Mailloux.

The papers announced for this meeting, in addition to those mentioned above, are as follows:

The Electrothermic Reduction of Iron Ores; Albert E. Greene and Frank S. Mac Gregor.

Discussion of the Electric-Furnace Experiments for the Production of Pig Iron at Sault Ste. Marie; Dr. Joseph W. Richards.

Electric-Furnace Experiments; Dr. H. N. Potter.

Discussion of Moissan's Experiments on the Boiling Points of the Metals; Dr. O. P. Watts.

The Electrometallurgy of Zinc; Gustave Gin.

A New Application of Chlorine in Metallurgy; C. E. Baker.

The Heat Conductivity of Carbon; F. A. J. FitzGerald.

Granular Carbon Resisters; S. A. Tucker.

Physico-chemical Notes on the Aluminates of Soda; P. B. Sadtler.

Action of Ammonium Persulphates on Metals; J. W. Turrentine.

Notes on the Use of the Capillary Electrometer for Alternating Voltages; M. G. Floyd.

Electroscopic Determination of Radium in some Tufa at Hot Springs, Arkansas; Dr. Herman Schlundt.

Electrolytic Separation of Silver and Copper; H. W. Gillett.

Electrolytic Determination of Minute Quantities of Copper; E. E. Free.

Electrolytic Reduction of Nitric Acid; Drs. H. E. Patten and Robinson.

Electrochemical Methods for the Qualitative and Quantitative Determination of Free Silicon in the Presence of Silica, Silicates, Oxides, Free Carbon and Carborundum; W. R. Mott.

On the Nature of Electrolytic Conductors; Dr. L. Kahlenberg.

The Electrolytic Theory of the Corrosion of Iron; Dr. A. S. Cushman.

On the Treatment of Storage Battery Elements before Putting them out of Commission; O. W. Brown.

A Further Study of Concentration Cells; Henry S. Carhart.

The Philadelphia & Reading Coal and Iron Company

This company, a subsidiary of the Reading Company, controls about one-fifth of the output of anthracite coal, its lands and collieries being in the Schuylkill district of the Pennsylvania anthracite region. Its report for the year ending June 30, 1907, shows stock, $8,000,000; collateral sinking fund loan, $1,260,000; due Reading Company for advances, etc., $79,195,703, and for interest, $400,000. The coal statement for the year is as follows, in long tons:

	1906.	1907.	Changes.
Mined by company	9,132,354	10,034,713	I. 902,359
Purchased	1,024,051	1,107,848	I. 83,797
Total	10,156,405	11,142,561	I. 986,156
Coal sold	10,275 605	11,492,512	I. 1,216,907
Decrease in st'ks	119,200	349,951	I. 230,751

The total coal mined by the company and its tenants from the lands which it owned, leased or controlled was 10,659,054 tons in 1906, and 11,655,101 in 1907; an increase of 996,047 tons, or 9.3 per cent. The cost of coal mined and purchased during the year was 1.5c. per ton less than for the previous year, and the price realized on all sizes was 3.1c. per ton higher, making a total increase in the net amount realized of 4.6c. per ton compared with the previous year.

The income account for the year was as follows, the averages being based on tons of coal sold:

	Amount.	Per Ton.
Receipts	$38,747,562	$3.37
Expenses	35,275,767	3.07
Net earnings	$ 3,471,795	$0.30
Fixed charges and taxes	$ 115,075	$0.01
Depletion of coal lands	499,059	0.04
Colliery improvements	1,345 229	0.12
Interest to Reading Co	1,583,914	0.14
Total charges	$ 3,543,277	$0.31
Deficit	$17,842	$0.01

As compared with the previous year there was an increase of $4,709,021 in receipts. The increase in expenses was $4,397,030, of which $1,836,814 was in expenses of mining, and $1,607,272 in transportation. Both were due to the larger quantity of coal handled. The expenses last year were 91.6 per cent. of the receipts. The interest paid to the Reading Company was 2 per cent. on the total debt. to that company.

The charge to depletion of coal lands is 5c. per ton of coal mined from the company's lands. On June 30 last the total amount of this fund reached $1,986,579, of which $462,768 had been expended for improvements, and $1,487,094 invested in securities; the balance of $36,717 being in cash.

The Philadelphia & Reading Railroad reports that the tonnage of anthracite carried increased from 11,856,871 tons in 1906 to 13,223,780 tons in 1907, a gain of 1,366,908 tons, or 11.5 per cent.; and the tonnage of bituminous coal from 10,487,598 tons to 11,190,250 tons, a gain of 702,652 tons, or 6.7 per cent. The revenue from coal traffic increased from $17,198,247 to $18,730,189, a gain of $1,531,942, or 8.9 per cent.

The increased radiating surface of aluminum over a copper wire of equal conductivity makes aluminum especially suitable for carrying currents of very large volume.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

E. T. Butler, of the Golden Sun Company in Gilpin county, Colo., is on a business trip to the East.

Theodore Dwight, mining engineer, of New York, was married to Miss Linda Kirchhoff, at New York, Sept. 26.

Arthur H. Simpson has been appointed superintendent of the Branch Mint mine in Lawrence county, South Dakota.

C. S. Ripley, manager of the Boston-Occidental Mining Company, operating at Apex., Colo., is on a trip to Boston.

J. J. White, manager of the Prudential Mining Company, of Georgetown, Colo., is making a business visit to the East.

George J. Bancroft, mining engineer, of Denver, has been examining mines in the Georgetown section of Clear Creek county, Colorado.

H. W. Kane, manager of the Tucker mine and mill in Gilpin county, Colo., is making a business trip to Chicago and other eastern points.

Samuel W. Osgood, mining engineer, has returned to Chicago, after a stay of a month at the stamp mill and cyanide plant of the Gould mines in Montana.

J. M. Callow, president of the General Engineering Company, Salt Lake, Utah, is on a professional trip to Arizona and Mexico, but will be back in Salt Lake about the end of October.

R. B. Lamb, mining engineer, of New York, is examining properties in Colorado. He will go from there to Mexico, to make examinations of some gold mines, before returning to New York.

A. A. Hassan has opened a branch office in Toronto, Ont., and is organizing the Hassan Exploration Company for the purpose of exploring the mineral resources of Ontario and Quebec.

J. E. A. Moore has severed his connection with the Wellman-Seaver-Morgan Company, Cleveland, Ohio, and has become associated with John W. Seaver, of that city, as a consulting engineer.

George D. Stonestreet, mining engineer, having completed his investigation of the Rosario mines in Honduras, Central America, has returned to New York and reopened his office at No. 45 Broadway.

L. W. Trumbull, mining engineer, of Laramie, Wyo., has returned to the University of Wyoming as professor of mining, after spending the summer in Colorado and California, and will remain there until January.

William A. Moore, who has been manager since April 1 of the Nittany Iron Company, Bellefonte, Penn., has recently been elected its president. Mr. Moore's last previous work was in the Pocahontas coalfield, as general manager and constructing engineer for the Page Coal and Coke Company.

In connection with the articles on mining in New Caledonia, which appeared in recent issues of the JOURNAL, the address of G. M. Colvocoresses, their author, was incorrectly given as Noumea, New Caledonia. Mr. Colvocoresses spent about four years in New Caledonia, but his present address is 43 Exchange Place, New York City.

Obituary

William H. Travis, a prominent iron and steel manufacturer of Wheeling, W. Va., died at his home in that city Aug. 20. He was 67 years old, and began a life of hard work at the age of 12 in a Wheeling nail house which carried him into nail manufacturing and finally made him manager of the La Belle Iron Works. For over 40 years he occupied that position and held it at the time of his death.

Samuel Sloan, whose death occurred last week at the age of 90 years, was known chiefly as a railroad man, his career having practically begun when, after filling several subordinate positions, he became superintendent of the Hudson River Railroad in 1855. Ten years later he was chosen a director of the Delaware, Lackawanna & Western Railroad Company, and served as president of that company from 1867 to 1899, or 32 years in all. In 1899 he retired from the active management, and was chosen chairman of the board of directors. As president of the Lackawanna, Mr. Sloan was an important figure in the anthracite trade, and his influence was generally felt. Under his management the Lackawanna expanded its business largely and successfully and established its position as an important through line, as well as one of the leading anthracite producers and carriers. During his later years, however, his administration came to be characterized by extreme conservatism, and his successor in the presidency found it necessary to make many changes in order to bring the road up to date. No fault was found with the financial management, and the company is a conspicuous example through its freedom from stock watering and other modern financial devices.

Societies and Technical Schools

Yale University—Mrs. James B. Oliver, the widow of James B. Oliver, one of the leading steel manufacturers of Western Pennsylvania, has made a donation of $150,000 to the Sheffield Scientific School of Yale University for the construction of a new recitation hall as a memorial to her son. The memorial, which may cost ultimately $250,000, will be called the Oliver Memorial Hall. Mrs. Oliver expects that it will be completed by June next.

American Society of Mechanical Engineers—This society will hold the first monthly meeting this fall on Tuesday evening, Oct. 8, in the main auditorium of the Engineering Societies Building, 29 West 39th street, New York. The subject of this meeting will be "Industrial Education."

The college technical courses and the student apprenticeship courses will be discussed at length. Professor John Price Jackson has written a paper on the college technical courses and apprenticeship courses offered by manufacturing establishments. Dr. Henry S. Pritchett, president of the Society for the Promotion of Industrial Education, and Professor Dugald C. Jackson, president of the Society for the Promotion of Engineering Education, will deliver short addresses on the subjects allied to their societies. Others have been invited to speak informally at the meeting.

Industrial

George W. Myers, California representative of the Chrome Steel Works, of Chrome, N. J., has returned to his former quarters, 724 Kohl Building, corner California and Montgomery streets, San Francisco, California.

The Bristol Company, Waterbury, Conn., is about to erect another new addition to the present plant. The new building is to be 53x170 ft., three stories high. This additional space is made necessary by the increased demand for Bristol recorders and Bristol patent steel belt lacing.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Ridgway Dynamo and Engine Company, Ridgway, Pa. Bulletin No. 18. Power Plants. Pp. 17, illustrated, paper, 8x10½ in.; September, 1907.

H. W. Johns-Manville Company, 100 William street, New York. Catalog No. 110. Morris Metallic Packing. Pp. 14, illustrated, paper, 4½x7 in.; 1907.

The National Steam Pump Company, Upper Sandusky, Ohio. Catalog No. 27. Steam Pumping Machinery. Pp. 100, indexed, illustrated, paper, 6x8½ in.

Construction News

Carbondale, Pennsylvania—The Scranton Coal Company will open up a new coal working east of the city on the Langdon and Franklyn tracts. The breaker to be erected will have a capacity of 1000 tons per day. A spur from the Scranton branch of the New York, Ontario & Western road will be run to the new breaker. The company is controlled by the New York, Ontario & Western Railroad, which has its office at 56 Beaver street, New York.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

Sept. 25—Shipments of copper ore from Bald Mountain district, Humboldt county, are worthy of note, though the ore referred to has been sorted out and selected from the mines of Geo. Henderson and Rev. E. P. Shire. Both gentlemen have mines located in the vicinity of Bald Mountain and have been developing them for over a year. Although the yield so far has been encouraging, the ore taken during prospecting yielded sufficient copper to pay for the work. It is thought that a much larger vein exists in the vicinity and will be eventually traced out. Another mine owned by Monroe & Loofburrow is also being worked in the same vicinity, and with equally encouraging results. Humboldt county has not heretofore been known as much of a mining section, but the recent activities give promising signs.

The Land Office at Visalia, Tulare county, has received notice from the General Land Office of the temporary suspension from entry of a large tract of land adjoining the Sierra Forest Reserve on the West, pending reports on the advisability of adding the same to the National Reserve. The tract embraces a strip of land averaging about five miles in width, reaching from Trimmer Springs, Fresno county, to Yokohl Valley, east of Visalia. It is 42 miles in length and contains 190,440 acres, with another strip reaching from White River in this county to Glenville, Kern county, nine miles long and containing 31,360 acres.

Properties of the Virginia Gold Mining Company, on the Mother Lode, near Coulterville, Mariposa county, have been transferred to Garnett & Priest, of Kansas City, and J. W. McLean, of Boise City, Idaho. The Virginia comprises five claims, aggregating about 100 acres. The property was developed in the early days and has been a producer until recent years. The work of rehabilitation now under way will be pushed with vigor until the power lines are installed, when a full force of men will be employed in the workings.

With the introduction of electric power other once famous producers on the Mother Lode in Mariposa county will resume operations suspended for the same causes that closed the Virginia. Among these are the Champion, Mary Harrington, Red Banks, Merced Gold, Pinon Blanca and Crown Lead, on the lode, and the Bob McKee, Red Cloud, Louisiana, and others of lesser note.

Evidence is being taken at San Andreas in a case involving certain rights in the Royal Consolidated Mines, Ltd., at Hodson, in Calaveras county, and the hearing of the arguments has been set for Oct. 1. This is a Mother Lode mine, carrying low-grade ore, and made a record for low cost of working the ores while it was in operation. The mine was sold some seven years ago to a company represented by J. C. Kemp Van Ee, who made a partial payment down, and, it is alleged, agreed to make the balance in installments from the profits of the mine. Since then many side claims have come in, and the object of the present proceedings, which were commenced by the Royal Consolidated Gold Mining Company, is to establish a vendor's lien, to give the company's claim precedence over all others. It was shown in the evidence adduced that over a million dollars worth of gold has been taken out in the last seven years, but the outstanding indebtedness to the Royal Company has not been satisfied, the contest being set up by Kemp Van Ee that the expenses consumed the profits.

It is not expected that any of the copper mines of Shasta county will close down on account of the lower price of copper. Indeed operations are being expanded. At Kennett the two new furnaces of the smelter will be started in a few weeks. The four new blowers for the furnaces are about ready. Two of these will be kept for emergency purposes. Three of the blowers will receive power from three 250-h.p. induction motors. The fourth one will be supplied by a 200-h.p. Westinghouse induction motor. A blower system is to be installed for the new converters. The power for this system will be furnished by a 750-h.p. General Electric motor. At Ingot, the smelter of the Great Western Gold Company will not have to shut down this winter through a lack of coke, as in the past when the roads became impassible because of the rains, for there is now in storage or in transit so that it will get there before the rains set in, six months' supply. The railroad to Bella Vista will soon be completed, at least so far as to get out of the belt of bad wagon roads.

Work has been temporarily stopped on the great smelting plant of the Selby Smelting Company, at San Bruno, San Francisco bay, awaiting the arrival here of Daniel Guggenheim, although several hundred thousand dollars have been already expended. Some 500 acres have been graded, a long wharf built and numerous buildings erected, including the general machine shop, and warehouse. Some of the rich landowners of Burlingame, near by, have organized to oppose the construction and operation of the smelter, and other places about the bay have also shown strong opposition to the project. Mr. Guggenheim will come here shortly to confer with these people and endeavor to show them that the smelter will do no harm to their lands.

Salt Lake City

Sept. 28—A receiver has been appointed for the Sevier Consolidated Mining Company, with properties situated in Sevier and Piute counties. The mine is well equipped with power facilities, and some extensive bodies of low-grade gold ores have been developed. A small mill has been operated for several months past; but the results have not been altogether satisfactory.

The lowering of the price of copper has caused some of the low-grade copper mines either to curtail their output or close down entirely. The Majestic Copper Company, with properties in Beaver county, has found it profitable for some little time past to ship ore from the Old Hickory mine, the values running from 2 to 4 per cent. copper. The mine has been closed since the metal dropped below 20c. The United States and Bingham Consolidated Mining companies have practically stopped mining and shipments of the low-grade sulphide iron ores from Bingham. While these ores carry only small copper values, they have never been very profitable except to be used as fluxing material for the silicious ores treated at the smelters from other districts. The mines affected are: the Telegraph and Galena, of the United States company, and the Commercial, of the Bingham Consolidated.

Labor difficulties are being experienced at Park City, and the pay-roll of the camp has been reduced between 500 and 600 men as a result of a strike affecting the Daily West, Ontario and Daly mines. The miners' union took offense at the management because a union shift-boss was discharged for failure to do his duty. The union demanded the reinstatement of the discharged employee, and upon the refusal of the management to do so, the strike was called. It is likely that the mines will be closed for some time.

The Western Pacific inaugurates initial train service out of Salt Lake City next week. One passenger train a day will be operated as far west as Bewa, Nev., the

junction point with the Nevada Northern railroad.

The Silver King Coalition Mines Company has posted its quarterly dividend of $187,500 for payment in October. The Columbus Consolidated will pay 20c. a share Oct. 15, being $56,708, on the issued stock.

The shaft of the Utah mine has been re-timbered from the top down to the eighth, or lower, level. It was so badly damaged by the fire which visited the property several months ago that this work was a matter of necessity.

Bisbee, Arizona

Sept. 28—General surprise was expressed here at the sudden termination of operations on the Cananea-Bisbee group, belonging to parties in Bisbee, which was under development by W. B. Thompson, of the New York firm of Hayden, Stone & Co. The property had made a fine showing of black sulphide copper in several shafts and drifts and looked as though it might become a valuable mine. Mr. Thompson asked an extension of time on payments, and as this was the second extension, the owners did not care to grant it. All work is now suspended. If the present option holders drop their connection, it is probable that others will take it up very quickly.

Several other cessations of work have taken place in the territory of late, said to be on account of delays in the receipt of material, etc., but possibly from the outlook for immediate selling of copper and the price, the mines in every case being producers of low-grade ores. The Christmas mine, in the Saddle Mountain district, Pinal county, which has been a very considerable producer, has closed for the time being, and 350 men have been thrown out of work. These men have gone to other properties in the county. Ore at the Christmas mine runs about 3 per cent. copper and carries some silver; the company has a smelter of 200 tons capacity, of the Mitchell type, and ships matte. Its production last year was about 2,250,000 lb. It is expected that a resumption will take place soon.

The Ray mine, in the Kelvin district, Pinal county, has laid off about 300 men, leaving 200 at work. The lay-off is said to be occasioned by delay in the delivery of material for the concentrator, and the consequent uselessness of piling up ore awaiting its completion. The Ray is a low-grade proposition, the future of which is in some doubt. It has always been rather difficult to save its copper values, but new processes to be undertaken are expected to overcome this obstacle.

At Bisbee the Denn mine is shipping 50 tons of ore per day and is developing on the 1100-ft. level, where it is stoping and opening good bodies. On the 1200, to which the shaft has now been sunk, drifting is in progress.

Denver

Sept. 21—Since about Aug. 10, when the strike of the telegraphers began, the wires into Leadville have conveyed no messages, and the offices have been closed. In another instance—Grand Junction, the end of a railroad division, is largely a union town—the non-union operator who was sent there to take the place of the deserting striker, was socially ostracized, and physically barred from obtaining such ordinary necessities as meals and bed. This town is also the headquarters of the Grand Valley Fruit Growers' Association, and the hight of the season for marketing their crops is at hand. The non-working of the wires inconvenienced association members badly and the Denver superintendent informed the association that if they did not see that his operator was accorded the protection to which any ordinary well-behaved citizen was entitled, he would close the office, and keep it so indefinitely. Net result, the non-union operator was provided with a room and board at the best hotel.

However, in spite of difficulties, Colorado business at this writing is within 30 per cent. of the business during a corresponding period in 1906, and though some inconvenience is still felt through interference with the wires by strikers, and by delay of messages, it may be said that the passing of the telegraph strike in the West is complete.

The Denver, Laramie & Northwestern is a new road projected from Denver through Ft. Collins, Laramie and a northwesterly direction through Wyoming, with Seattle as its northern terminus. It is reported here today that its backers have paid $100,000 for 160 acres within the city limits of Denver for their terminal. As far as is now apparent, the same means will be used to finance and build it as those used by the very clever and hypnotic Mr. Stilwell, in his construction of the Kansas City, Mexico & Orient, which is, under the circumstances, a most wonderful achievement.

Another railway projected is the Laramie & Routt County railway, organized to operate between the terminal point of the Laramie, Hahn's Peak & Pacific railway, in Wyoming, and the great lignite beds of North Park, Colorado. And with the widely published announcement that Harriman is to spend one hundred millions at once in double-tracking the western end of the Union Pacific, it does not appear as though there are any signs of cessation of prosperity in the West.

London

Sept. 21—The Royal Commission on Safety in Mines, now sitting in London, has made two sub-appointments for special investigations, which are of some interest. In the first place Dr. A. E. Boycott has been asked to conduct inquiries as to whether there is any indication of the presence of ankylostomiasis in the coal mines. Secondly, John Cadman is to make a series of tests and observations of mine air, with a view to collecting data enabling the commission to lay down a standard of ventilation in mines.

The Anglo-Sicilian Sulphur Company has just issued its report for the year ended July 31. This company has nowadays no control over the sulphur situation, which by the way seems to be going from bad to worse, owing to the inability of the Italian Government to cope with American competition. The company only exists for the purpose of winding up its business. In July of last year the company sold its stock of sulphur to the Consorzio Obbligatorio for guaranteed bonds representing 19,780,000 lire. Since then some of the bonds have been redeemed at par, realizing £65,300, and the remainder have been sold at 5 per cent. discount, yielding £682,000. Interest on the bonds has yielded a revenue of £28,592. The company has paid £42,000 interest at 6 per cent. on the preference shares during the year. It will not now be long before the company will be wound up, and the assets will liberally repay both preference and ordinary share capital.

The Tronoh Mines, working tin deposits in Perak, one of the protected States of the Malay peninsula, is one of the best of the Cornish smelters' speculations, over 140 per cent. having been paid on the capital of £160,000 since the company was formed in 1901. For the last year dividends have been paid every quarter at the rate of 40 per cent. The directors and managers have thought it a suitable time to introduce several improvements in the operations in the mines, with a view to economy. At the present time there are numerous small shafts and the plant is scattered. It is proposed to concentrate the plant and sink a new main shaft. At the same time it is intended to fit up an electrical installation to provide 2000 h.p. The cost of this new work will be between £50,000 and £60,000, and it is intended to provide the money entirely out of revenue, by reducing the dividend by one-half during the next year or so.

A year or more ago I referred in this column to a new scheme for bringing back prosperity to Ireland, in the shape of the Bonmahon Copper Mines Development Syndicate, the object of which was to prospect and reopen the old mines in Waterford. This project has already come to an inglorious end, and the shareholders are desirous of having the syndicate wound up under bankruptcy, so that the details of management may be thoroughly sifted. The allegations are that the mining operations were not seriously undertaken, and that the promoters and officials spent their time speculating in the shares. In due course we shall no doubt hear the whole story.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

United States Smelting, Refining and Mining Company—Charles G. Rice has been elected a director of this company in place of C. A. Hight, resigned. William G. Sharp has been elected president; Charles G. Rice, vice-president; F. W. Batchelder, secretary and treasurer.

Arizona

BISBEE DISTRICT

American-Saginaw—All work has ceased. The pumps have been pulled and all machinery is hoisted out of the shaft indicating a long shutdown. Extensive underground explorations have taken place here since the original Saginaw development company found a considerable body of leached ore on the 750-ft. level, and consolidation was made with American, one of the minor Cole companies. The Denn Arizona company is working in good ore and is finding excellent indications at several points.

Black Diamond—This old mine, at Pearce, many times operated and as many idle, is developing by shafts, and is to sink a two-compartment shaft to 225 ft. The work is to be done by contract.

Cochise Consolidated—This property, at Paradise, which has been in difficulty for years, has finally been bought under trust deed for the amount of the debts, and an effort will be made to reopen the mine. Stockholders have a nine months' redemption period. At one time this was the most ambitious copper development in the California mining district.

Copper Queen Mining Company—This company, at Bisbee, is connecting the underground workings with the Sacramento shaft, preliminary to adopting the underground electric tramming of all ore to the Sacramento, and hoisting by skip, instead of by cages at various points, as now. It will take a year or more to complete the changes and install the needed machinery. Railway tracks and yards for handling the entire product of the mine will be laid below the Sacramento shaft.

Imperial Copper Company—This company at the new town of Sasco, near Redrock, on the Southern Pacific, is erecting a matte smelter for ores from the mines at Silver Bell. The smelter buildings are of steel and the capacity will be 350 tons of ore per day. It will treat custom as well as company ores. The works will be blown in early in the year. Electricity from the works will be transmitted to Silver Bell for the use of the mines. These have been shipping 100 tons of ore daily to the Copper Queen Reduction Works at Douglass. The Silver Bell district of Pinal county includes, in addition to the Imperial company, the Arcade, Minas Cobre, Copperite, Oxide, Cleveland-Arizona and Indiana-Arizona companies, all engaged in development work.

Old Dominion—There is little question that curtailment will take place. Development work in the district will doubtless continue steadily, especially on such properties as Old Dominion, Globe Consolidated, Arizona Commercial and Superior & Boston, and the extensive improvements to the smelter will doubtless be carried on steadily. Globe Consolidated expects to get into copper early in the coming year, and will then be a customer of the smelter. Arizona Commercial has been increasing its output during the year, and is doing a large amount of work both in mining and in prospecting. National and Globe-Arizona, two new companies, are expected to carry on operations this winter, and the latter is shipping some ore.

Pyramid Peak—In the region southwest of Lordsburg, considerable development is in progress and on some properties, like the Nellie Bly, good copper ore has been cut at depths. The district is handy to transportation.

PIMA COUNTY

Omega—This copper-mining company, operating in the Helvetia district, reports that it is making regular shipments of ore.

California

BUTTE COUNTY

Chrysoprase—W. S. McAllister has found, near Magalia, a deposit of this gem-stone and is now mining it.

North California Mining Company—This company, owning several hundred placer claims in the north fork of Feather river, has commenced doing its annual assessment work.

INYO COUNTY

Black Cañon Mining Company—At a recent meeting of this company, M. T. Stovall was chosen as managing director, and St. John Robinson as superintendent and resident manager.

Great Western Ore Purchasing and Reduction Company—This company is making extensive ore shipments from Keeler, and has lately struck some fine silver-lead ore in the old Cerro Gordo mine in the new winze from the 900-ft. level.

New Coso Mining Company—This company, at Darwin, has struck another large body of silver-lead ore on the 460-ft. level. The new machinery and two large hoists will permit of larger monthly shipments of ore. The shaft is to be sunk 100 ft. deeper.

Ubehebe—This new copper camp is 60 miles from Bonnie Claire or Montana station in Nevada, with which it is connected by wagon road. John Salsberry and others are arranging now for a smelter and a railroad.

MODOC COUNTY

Williams, Turner and Mason—This property, in the Hoag district, has been incorporated and a crew of men is now putting up cabins, etc., for the miners this winter. A good force of men is to be kept at work.

MONO COUNTY

Crystal Lake Mining Company—At this property, at Lundy, R. T. Pierce, manager, a number of improvements are being made and a new cyanide plant will be installed.

Pittsburg Liberty Mining Company—Several tons of high-grade ore from this property, at Masonic, have been sacked, and about 2000 tons are on the dump. The Brougher mill is completed, and a tram 3000 ft. long will run from mine to mill.

PLACER COUNTY

Iron Mine—L. C. Trent and R. C. Penneman are developing the old iron property at Clipper Gap, which is found to be much more valuable for copper than for iron. Three shifts of men are at work.

Pond—It is reported that this Forest Hill mine has been sold by E. T. de Roode to the Louise company.

PLUMAS COUNTY

Altoona—Firmstone & Richards are taking fine ore out of this mine at Cherokee. The vein is 4 ft. wide at a depth of 300 ft.

SAN BENITO COUNTY

Kiser & Seymour—An interest in this quicksilver mine on Clear creek has been bought by E. E. Bray, of Santa Clara, who will put men at work developing it.

SAN BERNARDINO COUNTY

Ord Mountains—Recent dispatches from Daggett confirm the first reports of the

rich strike at this place, and hundreds of prospectors are rushing into the new gold center. The best ore has been found at the Hasson Bros. camp.

Strike at Wingate—W. Usrey, W. Carter and the Teegarden Bros. have found very rich ore at this place, formerly known as Lone Willow, near the Inyo and San Bernardino county line. One pocket is reported to have yielded $10,000. These men have staked 130 claims.

SIERRA COUNTY

Jim Crow Cañon—At this place near Forest a new quartz strike has been made, which is believed to have been the feeder for the rich placers in the old Emigrant and Nebraska gravel mines.

Young America—At this mine, at Forest, high-grade gravel is being breasted upon the west rim of the channel.

Colorado

CLEAR CREEK COUNTY

Aliunde—Boston capitalists have taken an option on this property near Georgetown.

Bertha—New capital is being raised for the operation of its interests along the Newhouse tunnel line, and new machinery will be needed. Dr. McClannahan, Boonville, Mo., is manager.

Captil—Arrangements are under way for the erection of a modern concentrating mill. The company will also purchase a large air-compressor plant. Wm. Cooper, of Georgetown, is manager.

Red Oak—It is reported that this group near Georgetown has changed hands to Chicago capitalists for $150,000 and that they will erect a concentrating plant for handling the ores.

GILPIN COUNTY

Colorado and Southern—This company, operating the Maine and Hamlet groups, intends to purchase an air-compressor plant. W. L. Shull, Central City, is manager.

Empire—New York people have purchased the reduction plant formerly owned by the Idaho Springs Mining and Reduction Company, at Idaho Springs. The plant is of 200 tons daily capacity. R. E. L. Townsend, Central City, is manager.

GRAND AND ROUTT COUNTIES

Red Gorge—An air-compressor plant is to be installed and electrical power will be used. John A. Desch, Red Gorge, is manager.

Hahn's Peak—Iowa people are interested in the purchase of 520 acres of placer ground from Messrs. Blackburn & Condelin. The company intends to ship in two large dredges for heavier operations on Beaver creek, near Hahn's peak.

LAKE COUNTY—LEADVILLE

Big English Gulch—This region north of Leadville has experienced a revival of mining during the past four months, and arrangements are now being completed at several properties to continue the work during the winter. The Bug Gold Mining Company is considering a long tunnel to cut the body of low-grade gold-milling ore. Work will be resumed for the winter on the claims owned by the Big English Mining Company, and the shaft, now 100 ft. deep, will be sunk deeper. The property has a good plant of machinery and the showing at the bottom of the shaft is good. Louis Franke has driven a tunnel on the Kankakee about 300 ft. and recently opened a body of quartz ore that runs high in gold.

Cotton Tail—At Little Union gulch, Al. Rivers has sunk a shaft on this claim to a depth of 112 ft., and crosscut to the vein which is 7 ft. wide.

Electric Power—The advance of 50c. per ton in the price of coal has induced a number of mine owners to install electric power. Mines in the outlying districts will also adopt this power. They are compelled to pay $9 per ton for coal delivered at the mine.

Empire Gulch—This section has received considerable attention during the summer. The Grandview group, toward the head of the gulch, and worked by the Hurm brothers, has opened up a good body of ore in one of the tunnels. A sample of 50 tons sent to the smelter gave returns of 57 oz. silver, 67 per cent. lead and 0.9 oz. gold per ton. The ore is in the lime-porphyry.

Greenback—The surface improvements are nearly completed and the work of unwatering will be started in a few days. The mine is expected to ship about 500 tons of sulphides daily.

Roy Group—This group, adjoining the Mammoth, Big Evans gulch, and owned by Thomas F. Walsh, will start work about Oct. 1. A shaft will be sunk on the south side line of Roy No. 6 and will be sent down 600 ft., as a starter.

Indiana

GREENE COUNTY

A complaint has been filed by the Jacksonville and the Calora Coal Mining companies with the State Railroad Commission against the Southern Indiana Railroad, asking the commission to draft a set of rules providing for proper car distribution. The coal companies allege that the carrier is discriminating in favor of mines owned by the company. Other mining companies are making similar complaints.

KNOX COUNTY

Knox Coal Mining Company—Fire destroyed the buildings, including the tipple, engine and boiler rooms with the shop and fan house of this company near Bicknell. The only structure saved was the powder magazine and mule stable. The engine room contained a new dynamo and engine with hoisting machinery. Two new mining machines, unloaded during the day of the fire, were also ruined. The machinery was valued in excess of $15,000 and the total loss foots up more than $30,000, with partial insurance. The origin is attributed to the smokestack. About 150 miners will seek employment in other mines until operating conditions are restored.

VIGO COUNTY

The coal situation is becoming serious. Much of the trouble is due to lack of cars and the slow movement and distribution at Terre Haute. Operators and coal buyers are away behind in their orders and are trying hard to catch up. Prices advanced 25c. a ton on Oct. 1.

Michigan

HOUGHTON COUNTY—COPPER

Hancock Consolidated—The new Sullivan hoist, installed at the new No. 2 shaft, has been completed and will soon go into regular commission.

KEWEENAW COUNTY—COPPER

Keweenaw Copper Company—President C. A. Wright and Managing Director Thomas Hoatson are in New York attending a meeting of the directors, when plans will be formulated for the coming year. Work on the Medora shaft is progressing favorably. A crosscut from the 675-ft. level cut another vein, which runs parallel to the main vein. It is 15 ft. wide at the point of intersection, and is well mineralized. An assessment of $1 per share, due Oct. 1, will furnish funds to carry on developments. The company has a well-equipped stamp mill, the Phœnix, which has a capacity of about 300 tons per day. It is expected that the Medora shaft will be able to keep this mill in continuous operation.

Ojibway—Work will be started on the second shaft within a few days. No. 1 shaft is being rapidly inclosed.

Nevada

NYE COUNTY—BULLFROG

Denver—The lateral work from the bottom of the 200-ft. winze in the Denver mine of the Tramp Consolidated Company has brought the deepest point in the property into ore. The winze is 200 ft. below the fourth tunnel level, with a vertical depth of about 450 ft.

Gold Bar—Developments in this mine are favorable. Large ore reserves are being blocked out. Preparations are being made to receive the material and machinery for the 10-stamp mill. Three carloads of machinery, together with a

large consignment of lumber, have arrived, and will be transported to the mill-site as soon as possible. Foundations for the mill are nearly completed. The pipe-line is finished. and everything is in readiness to begin the construction of the plant.

Homestake—The north and south drifts at the 500-ft. level are showing good milling ore, and are out about 50 ft. either way. The company's well has developed a flow of 50,000 gal. per day and the supply is increasing with depth.

Mayflower—The ledge in the crosscut at the 400-ft. level is yielding excellent assay values. The shaft, which is now down 435 ft., is being continued to the 500-ft. level.

Shoshone—The management has increased the ore shipments to 200 tons weekly. The electrical plant at the company's new mill has been completed and the power company has stated that it will be able to supply the necessary power within a few days. Crushing will be commenced as soon as the current supply is available.

NYE COUNTY—TONOPAH

Tonopah Extension—The north crosscut at the 1050-ft. level is out 450 ft. in good loking ground. Conditions throughout the workings are improving. The ore between the 400-ft. and 275-ft. levels is reported to be of shipping grade. The usual quantity of ore is going forward to the smelters in regular shipments.

Ohio

BELMONT COUNTY

Baltimore & Ohio Coal Company—On this company's property, at Lafferty, a shaft is being sunk to a depth of 90 ft. into a seam which extends over some 3000 acres controlled by the company. A slope is also to be made and the mine is expected to be in operation inside of a few months. The machinery, which is now being installed under the personal supervision of President Prendergast, will give a daily output of 3000 tons. The improvement involves the building of a branch railway, to be known as the Belmont Central, which will connect with the Baltimore & Ohio.

Oregon

BAKER COUNTY

Eagle Mountain—Jack Thompson has sold to Charles P. Murphy, of Baker City, and others, representing an eastern syndicate, the property situated on Paddy creek in the Eagle mountains.

United Elkhorn—Manager Edward I. Field has the mill running again and is employing about 40 men in the mine and on top. He is preparing to ship the concentrates to the smelter.

Pennsylvania

ANTHRACITE COAL

Lawrence—Herkser Brothers, of Mahanoy City, have secured a lease of this colliery, at Mahanoy Plane, which they will operate. They have commenced the work of timbering and sinking the slope.

Susquehanna Coal Company—An electrical plant is in course of construction at Glen Lyon which will be the first for this company to use in the operation of its mines. The coal will be hoisted from No. 10 slope by electricity, while a motor in the mine will haul the cars to the foot of the slope. In many other places compressed air supplies the motive power, but in this case it has been deemed advisable to install an electrical plant, owing to the distance between the slope and the compressed air station.

Woodward—A somewhat novel method is being adopted in the construction of the large new shaft for the Delaware, Lackawanna & Western company at this colliery in Luzerne county, the work being in charge of Alex Allaire, a New York engineer, and the contract having been awarded to the Foundation Company, of New York. The new shaft, which will be 850 ft. deep, will have three compartments, one for the employees, the second to convey the pump pipes, and the third exclusively for ventilation. The walls of the shaft, of heavy reinforced concrete construction, will be built in sections above ground. Each section will be 30x60 ft. and about 25 ft. in hight. The first section will be erected on the surface. Then a large force will be engaged with drilling machinery in cutting a rectangular channel into which the concrete shall be guided.

BITUMINOUS COAL

Pittsburg Coal Company—This company's statement for the eight months ended Aug. 31 is as follows:

	1906.	1907.	Changes.
Earnings.....	$3,296,076	$3,681,984	I. $385,908
Charges.	2,056,610	1,868,231	D. 188,379
Surplus.....	$1,239,466	$1,813,753	I. $574,287

The charges this year included $487,907 for depletion of coal lands; $652,064 reserve for depreciation of plant and equipment; $728,260 interest on bonds.

South Dakota

CUSTER COUNTY

Lillian Belle—The annual meeting resulted in the election of the following directors: John Mallon, W. H. Palmer, C. E. Perrin, Charles Harbach, C. E. Smith. The officers are: President, John Mallon; vice-president, C. Harbach; secretary-treasurer, W. H. Palmer.

Rupert—This group, on French Creek, has been taken over by the American Mining Company, just organized by Sioux City, Iowa, men, and will be operated this winter.

Saginaw—A new $8000 hoist will supplant the one burned down on this property, and the work of building the 200-ton mill will continue with slight delay.

LAWRENCE COUNTY

Golden Reward—A new Huntington and a new Chilean mill are being installed, to bring up the capacity to 300 tons daily.

Lucky Strike—The directors at a special meeting ordered another 100 ft. of shaft sunk. The 30-stamp mill is expected in operation by November.

Mohawk & Mary—State Mine Inspector N. Treweek, and associates of Deadwood, have taken this property on a bond and lease, and it will probably be turned over to an English syndicate that has options on several hundred acres of ground in the same district.

North Homestake—Extensive repairs are being made, preparatory to resumption. The shaft is being enlarged into three compartments and will be sunk another 100 ft. to the 320-ft. level. The stamp mill is being equipped with electricity, and a Chamberlain filter press is being installed for greater extraction of slimes.

PENNINGTON COUNTY

Auburn—Tests with the Michaelson concentrator, the first in use in the Black Hills, have proved successful in extracting from 80 to 90 per cent. of the values in the ore

Canada

BRITISH COLUMBIA—BOUNDARY DISTRICT

British Columbia Copper Company—Another air compressor has been ordered for this company's Mother Lode mine, near Greenwood, a duplex tandem compound Rand-Corliss engine. The two high pressure cylinders are 18x36 in.; the two low pressure 36x36 in.; capacity 3400 cu.ft. of free air per min., about 30 machine drills. It is planned to have this new plant running early in January and thus to double the present power drill capacity.

NOVA SCOTIA

Dominion Coal Company—Shipments of coal for August amounted to 316,633 tons as against 327,734 for August 1906.

QUEBEC—ABITIBI DISTRICT

Mosher Gold Locations—These claims staked some time since by Dan. Mosher, on islands in Lake Abitibi, have been held under option by the La Rose interests, who have done extensive development work. Two steam plants are running, and one shaft is down 76 ft. on a rich vein, 30 in. wide. Drifting is being done at that level.

ONTARIO—BANCROFT DISTRICT

Mineral Range Iron Mining Company—Work is actively in progress on the prop-

erties of the company at Bancroft. A spur line three or four miles in length has been built to the mines from the Central Ontario Railway and about 100 tons of magnetite ore are being shipped daily to Midland, Ont., and Radnor, Que.

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore for the week ending Sept. 21 were as follows: Buffalo, 60,000 lb.; Coniagas, 64,000; La Rose, 127,750; Nipissing, 147,640; O'Brien, 60,760. Total, 460,150 lb.

Drummond—Active development work has been resumed. Drifting has been done for 400 ft., at the 100-ft. level, from the main shaft, and also for 300 ft., at the same level, on the Wright vein. Test pits are being sunk on other veins.

Townsite—The shaft has been sunk 100 ft. and 600 ft. of drifting and crosscutting done, at the 50-ft. level, disclosing several new and promising veins.

ONTARIO—MONTREAL RIVER DISTRICT

Elk Lake Silver Area—An important find is reported in the 6th Concession of James township consisting of a 12-in. calcite silver vein, with cobalt and cobalt bloom. A 50-lb. nugget carrying from 25 to 40 per cent. silver has been taken out and rich ore is being sacked. Herbert W. Gates is one of the owners.

ONTARIO—PORT ARTHUR DISTRICT

Hanson Consolidated Silver Mines Company—A party comprising several leading members of the company and others, guests of Herman Auerbach, the treasurer, visited the West End Silver Mountain mine last week. Two new 6-drill air compressors have been installed.

ONTARIO—STURGEON LAKE DISTRICT

St. Anthony Reef—Operations have been resumed at this gold mine by a force of 35 men in charge of E. S. Steele.

Mexico

CHIHUAHUA

Shipment of Zinc Ores—E. R. Walters, superintendent of the Chihuahua division of the Mexican Central Railroad, has been given instructions to resume the shipment of zinc ore upon which an embargo was placed some time ago, as soon as the foreign roads to El Paso, Tex., are able to handle the transfers.

San Toy—The four miles of aërial tramway have been completed and operations have been begun. At present the chief difficulty is in securing a sufficient number of cars to handle the ore.

San Rafael—This property adjoining the Rio Tinto, at Terrazos, north of Chihuahua, has been taken under option at $50,000 by R. B. Hutchison, for the Corrigan & McKinney interests, of Cleveland. Mr. Hutchinson has for several years been in charge of the Concheño, which was recently sold to W. R. Greene for $3,000,000.

Waterson Gold Mining Company—John J. Waterson has completed the installation of Bryan mills and concentrators in the properties at Usuachic, in the Rayon district.

Palmilla—Joseph A. Coram, of Boston, Mass., and others have leased the Alvarado silver mines at Parral for 15 years, for a rental of 45 per cent., out of which Pedro Alvarado, the owner, will pay 7 per cent. interest and the principal of a loan of $300,000 made to him in addition to a cash bonus of $100,000 gold, already paid over by Mr. Coram, who has organized a syndicate for $500,000 to finance the lease, calling for the immediate payment of $400,000, and providing $100,000 for the erection of a mill to treat the lower grade ores. Eighty per cent. of the amount has already been subscribed. Frank C. Morehouse, of the Mexico Consolidated Company, has been placed in charge and companies will soon be incorporated in Maine and Mexico to operate the properties. The Coram interests will receive 55 per cent. of the proceeds of operation.

DURANGO

El Toro—A tunnel is being driven to cut the vein at a greater depth, and as soon as the development work will warrant, the old 40-ton lixiviation plant will be again put in operation. In Topia, the McDonald Bros. are by systematic development work making an enormous property of La Perla, which they purchased last year for $200,000 from Roman Espinosa. And this latter is endeavoring to organize in Mexico City a company for the purpose of installing an electric plant in Topia, from which to furnish power to the various properties. At San Fernando, a lease and bond at $100,000 Mexican has been taken on the Comstock mine of the Compañia Mineral Siete Amigos by Lic. Lizardi, of Mexico City, who will push development work.

GUANAJUATO

Guanajuato Amalgamated Mining and Milling Company—This company has decided to increase the capacity of its plant by the addition of some approved method of slime treatment.

SONORA

Moctezuma Copper Company—Fifteen standard Allis-Chalmers induction motors have been purchased for use on the properties of this company at Nacozari.

GUERRERO

Mitchell Mining Company—Rails for the La Dicha & Pacific railroad connecting the mines with the Pacific coast have arrived at Acapulco on the steamship "Strathalan."

Peru

Cerro de Pasco—According to latest advices, this company has two furnaces in operation, each smelting about 250 tons of ore per day. The combined production is nearly 50 tons of blister copper per day, or about 2,500,000 lb. per month. Consequently, the ore is yielding nearly 10 per cent. copper. These two furnaces have been in steady operation during the current year. It is expected that a third furnace will be blown in within a month from now.

Africa

RHODESIA

Gold production in August was 54,558 oz. bullion, the highest monthly output ever reported. For the eight months ended Aug. 31 the total was 360,989 oz. bullion in 1906, and 400,604 oz. in 1907; an increase of 39,615 oz. The bullion reported this year was equal to 356,538 oz. fine gold, or $7,369,640 in value.

WEST AFRICA

Gold production in August is reported at 24,650 oz. bullion. For the eight months ended Aug. 31 the total was 138,019 oz. bullion in 1906, and 191,632 oz. in 1907; an increase of 53,613 oz. The bullion reported for the eight months in 1907 was equal to 179,978 oz. fine gold, or $3,720,143 in value.

Australia

WESTERN AUSTRALIA

Gold production in August is reported at 139,142 oz. fine, being 10,587 oz. more than in July. For the eight months ended Aug. 31 the gold output was 1,211,636 oz. fine in 1906, and 1,105,854 oz. in 1907; a decrease of 105,784 oz., or 8.7 per cent., this year.

Chanami—Among the miners in the northern districts, and especially in the districts around Kimberley, Chanami, or, as it is sometimes called, Tanama, is spoken of as one of the most wonderful gold regions in the world. Chanami is the native name of a water-hole in the rocks in South Australia, a little way from the West Australian borders. It is a district where the rain falls only once a year, in February or May, and can only be prospected with difficulty. Prospectors state that an exceedingly rich mineral belt stretches right across Australia from Kimberley in West Australia to the Cloncurry copper field in Queensland. In the vicinity of Chanami gold and silver predominate in the lodes, but farther east copper is the principal metal found. The West Australian government has been petitioned to assist prospectors to prospect the country. The officials at Kimberly have reported favorably on the project.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Oct. 2—The coal trade in the West continues in good condition, but here and there complaints are heard of car shortage and of delays in transportation. These early troubles are indications of more serious delays in the later months of the year, and operators are beginning to be disturbed at the prospect. For the present the demand for coal is generally good and prices fairly maintained.

In the South the car supply is good, the smaller cotton crop relieving the pressure for cars usually felt at this time of the year.

In the East, the Atlantic seaboard trade is calling for and absorbing large amounts of bituminous coal, especially in New England where the demand is pressing. Consumers seem desirous to get in their winter stocks as early as possible. The anthracite market has been characterized by a sudden increase in demand for prepared sizes which took place during the week, and certain sections, especially the middle West, are making urgent requests for immediate shipments. So great is the demand, however, at the present time, that the producing companies have found it impossible to supply these customers completely. The situation in small steam sizes remains unchanged, the greatest scarcity being in pea and buckwheat No. 1, for which the demand is heavy.

According to the report of the District of Columbia commission the method of purchasing coal upon the basis of its calorific value, as suggested by the Geological Survey, did not meet with the success anticipated. When the bids were received they were found to be so much in excess (about $7500) of the prices quoted on a like quantity and quality of coal under the old form of proposal, that the commissioners rejected them, and advertised for proposals under the old form of bidding. Bids were received at a much lower figure than under the analysis basis, and contracts were entered into under this form.

Coal--traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Sept. 21 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite	3,131,356	4,063,733	I. 932,377
Bituminous	22,871,020	27,957,480	I. 5,086,460
Coke	9,101,089	10,138,787	I. 1,037,698
Total	35,103,465	42,160,000	I. 7,056,535

The total increase this year to date has been 20.1 per cent.

Coal receipts at St. Louis for the seven months ended July 31 were 4,101,769 short tons in 1906, and 4,240,777 in 1907; an increase of 139,008 tons.

Coastwise shipments of coal from the chief Atlantic ports for the seven months ended July 31 are reported as follows:

	Anthracite.	Bituminous.	Total.
New York	9,861,119	8,446,530	18,307,649
Philadelphia	1,375,671	2,763,958	4,139,629
Baltimore	149,069	2,113,500	2,262,569
Newport News	.....	1,548,251	1,548,251
Norfolk	.....	1,061,648	1,061,648
Total	11,385,859	15,933,887	27,319,746
Total, 1906	9,048,452	12,674,628	21,723,080

The total increase this year was 5,596,666 tons, or 25.8 per cent.

Shipments of bituminous coal and coke over various railroads in western Pennsylvania and West Virginia for the seven months ended July 31 are reported as follows, in short tons:

	Coal.	Coke.	Total.
Balt. & Ohio	14,999,084	3,365,427	18,364,511
Buff., Roch. & Pitts.	4,083,109	366,259	4,449,368
Penn. lines, N.Y.Cen.	4,720,239	48,571	4,768,810
Pitts. & L. Erie	6,159,794	3,099,284	9,259,078
Norfolk & Western	6,830,103	1,505,530	8,335,633
Total	36,792,329	8,385,071	45,177,400
Total, 1906	33,852,733	7,750,525	41,603,258

The increase in coal was 2,939,596 tons; in coke, 634,546; the total gain being 3,574,142 tons, or 8.6 per cent. In addition to the tonnage given above, the Baltimore & Ohio carried 501,812 tons of anthracite coal in 1906, and 584,301 in 1907; an increase of 82,489 tons.

New York

Anthracite

Oct. 2—The demand for prepared sizes has greatly increased and the market is strong. Producers are having difficulty in supplying the demand, and the present activity is not expected to abate for some time. The demand for the small steam sizes is greater than ever, and the supply has not increased. The prices are quoted as follows: Broken, $4.75; egg, stove and chestnut, $5; pea, $3.25; buckwheat No. 1, $2.75; buckwheat No. 2, or rice, $2.15@2.25; barley, $1.75; all f.o.b. New York Harbor.

Bituminous

Trade in New York harbor is not particularly active, although a considerable tonnage of coal is being absorbed at this port. Good grades of steam coal bring $2.75@2.80, f.o.b. New York harbor, and some of the better grades sell for considerably more. Trade in the far East is good, and consumers are still calling for coal. This territory does not seem to cease in its demands for fuel, and large shipments are constantly going forward to complete the winter stocks before navigation closes.

Pocahontas, New River and other southern West Virginia coals seem to be a trifle easier this week, and more of these grades are going into the hands of consumers. Pennsylvania coal is also in good demand.

Trade along the Sound is not especially heavy, and consumers do not seem to be making any great efforts to take on large quantities of coal.

All-rail trade is beginning to pick up and is taking on fair quantities of good grades of coal. Transportation from mines to tide is fairly good, cars going through on about schedule time, but the car supply is growing steadily worse, owing to the demand made upon the railroads to transport grain at this time.

In the coastwise trade, vessels are in good supply and the scarcity, which has been apparent all summer, has been relieved. The freight rates remain unchanged, and are quoted as follows: From Philadelphia to Boston, Salem and Portland, 90c.@$1; to Lynn, Newburyport and Bangor, $1.10; to Portsmouth and Bath, $1; to Saco and Gardiner, $1.25 and towage; to the Sound, 80c. per ton.

Birmingham

Oct. 1—Coal operations in Alabama show a decided improvement, some of the new mines now starting in with a daily output. The Pratt Consolidated Coal Company is getting out a big tonnage. The Tennessee Coal, Iron and Railroad Company will shortly be getting out coal from some of its new mines. The Sloss-Sheffield Steel and Iron Company is also getting a steady output of coal.

The statement is still given out that there is a demand for every ton of coal that is being mined. The railroads continue to give fair service in the way of handling the product and complaints so far are not very pronounced. No change is reported in coke.

Chicago

Oct. 1—Continued strength, the demand for domestic coals increasing and the business transacted large in almost every branch of the trade, characterize the coal market. The only approach to weakness is in fine coals. Western prepared sizes are especially strong and sellers of Eastern coals are complaining of transportation

troubles. Most dealers, indeed, are complaining of lack of cars and much apprehension exists about the situation a month or two hence.

Western lump and egg are gaining strength at $1.90@2.65; run-of-mine brings $1.70@2.40 and screenings are weak at $1.05@1.40. Brazil block sells exceptionally well at $3.20.

Gas coals are strong, in the Eastern list. Youghiogheny brings $3.35 for ¾-in.; Pittsburg No. 8 sells for $3 for 1¼-in. lump. Hocking has advanced from $3.30 to $3.50 with sales very good.

Anthracite is increasing in sales with the demand in the country reported especially good.

Cleveland

Oct. 1—No appreciable change in the local coal market is noted this week. Prices are holding steady. No. 8 Ohio district slack is quoted at 65@70c., with some cars going higher; mine-run, $1.20; ¾-in. $1.20. Dealers report no let up in the demand but an increase in the intensity of the car situation. Local shippers are unable to take contracts on distant points with any degree of certainty as to their ability to make good on the deliveries.

Pittsburg

Oct. 1—An advance of 5c. a ton, effective today, was ordered by several large producers and new quotations for this month are as follows: Mine-run, $1.25@1.30; ¾-in., $1.35@1.40; 1¼-in., $1.45@1.50; slack, 85@90c., all f.o.b. mine. The demand is increasing and the car supply is not adequate to keep the mines running to capacity. There is also a scarcity of labor and these conditions may cause still further advances in price. Shipments to the lake ports continue as heavy as the car supply will permit.

Connellsville Coke—The demand for coke for spot shipment and on contract is as great as ever and prices are unusually firm. Standard Connellsville furnace coke is quoted at $2.85@3.10 and foundry coke at $3.25@3.50. The American Smelting and Refining Company has contracted for 55,000 tons of smelter coke, 25,000 tons for delivery this year and the rest for shipments extending through 1908. The price is said to be uniform at $1.85 a ton at ovens. The *Courier* in its weekly summary gives the production in both fields at 427,969 tons and the shipments 14,179 cars, distributed as follows: To Pittsburg, 4948 cars; to points west of Connellsville, 8285 cars; to points east of Connellsville, 946 cars.

Foreign Coal Trade

Exports of fuel from Great Britain, with coal sent abroad for the use of steamships engaged in foreign trade, are reported as follows for the eight months ended Aug. 31, in long tons:

	1906.	1907.	Changes.
Coal	36,569,442	41,405,273	I. 4,835,831
Coke	499,471	586,231	I. 86,760
Briquets	960,449	981,468	I. 21,019
Total exports	38,029,362	42,972,972	I. 4,943,610
Steamer coal	12,304,086	12,364,530	I. 60,444
Total	50,333,448	55,337,502	I. 5,004,054

The total increase was 9.9 per cent. The exports to the United States, included above, were as follows:

	1906.	1907.	Changes.
To Atlantic ports	21,531	13,766	D. 7,765
To Pacific ports	28,002	31,682	I. 3,680
Total	49,533	45,448	D. 4,085

The larger exports this year were 7,068,034 tons to France; 6,227,248 to Germany; 5,703,034 to Italy; 2,645,507 to Holland; 2,202,629 to Sweden.

The coal bunkered or supplied to steamers engaged in foreign trade at United States ports for the seven months ended July 31, 1907, was 3,271,779 long tons. Adding this to the exports, previously reported, makes a total of 10,405,509 tons sold for consumption beyond the limits of the United States.

Iron Trade Review

New York, Oct. 2—The iron and steel markets have remained for the most part dull and rather uncertain, so far as new business is concerned. There has been some contracting for structural material, but some large business is reported to be held back, in expectation of lower prices. The greater part of the orders placed has been for railroad-bridge work, but some small contracts for buildings are included.

In pig iron the foundries are still holding back altogether, or buying only for immediate requirements. Some furnaces are making concessions in prices for first-quarter deliveries, but in most cases there is no special pressure to sell. The demand for basic iron seems to be satisfied for the present. It does not seem probable that there will be much contracting ahead until matters are more settled.

At a meeting of the Eastern Pig Iron Association, held in Philadelphia recently, it was stated that several of the stacks belonging to members of the association which have been in blast for long periods, would shortly be blown out in order to make extensive and long-needed repairs; in fact, one or two stacks have already been blown out, and others will follow very shortly. Some furnaces are being held in at considerable disadvantage in order to complete deliveries against contracts on which shipments must be made promptly.

Steel-rail Specifications—The subcommittee on steel-rail specifications appointed by the General Conference Committee of railroads and steel works representatives, has held several sessions in New York City. The general committee, of which Geo. L. Peck, of the Pennsylvania is chairman, met again last week to receive the sub-committee's report. It is expected that the report will recommend an increase of about 10 per cent. in the weights of the larger standard sections, the additional metal to be chiefly in the web; also an increased discard in the ingots. When the general committee agrees upon the new specification the various members will report it to the presidents of their respective companies, and a final conference will then be arranged between the presidents of railroads and of rail manufacturing companies.

Baltimore

Oct. 1—Reports for the week included 172 tons of spiegeleisen, 1189 tons of ferro-manganese and 183 tons of ferro-silicon; also 339 tons of manganese ore. There were received also 8019 pigs spelter from Rotterdam. Receipts of iron ore were 5375 tons from Cuba.

Birmingham

Oct. 1—The last quarter of the year opens with Southern pig-iron manufacturers hopeful of a quick recovery in general conditions. With the probable make for the balance of the year practically covered, furnacemen are just waiting for consumers to return to the market for future needs and are making no effort to get business.

No price is made for future delivery, that is, after Jan. 1, 1908, under $16 per ton. What little iron is selling now for delivery during the balance of the year is being quoted at $17.50@18 per ton, No. 2 foundry. There is no accumulation of iron in the southern territory.

Raw-material supplies show little improvement. The labor situation is still acute; quite a number of foreign laborers are leaving the district, being dissatisfied with the system of working. The negro labor in the big Birmingham mills is not doing as well as was expected. Notices placed around the works announce that the Republic Company had turned over the operation of the plant to the Tennessee Coal, Iron and Railroad Company. No changes are noted in steel operations.

Chicago

Oct. 1—The pig-iron market shows increased inquiries for future deliveries, but actual sales are not yet numerous, nor for large amounts. Prompt-delivery business continues the most common, and orders are small.

For Northern iron quotations are $22.50@23 for fourth-quarter delivery and Southern is at $18@18.50 Birmingham for the same period. For 1908 delivery, first quarter, Southern is quoted at $17@17.50 Birmingham ($21.35@21.85 Chicago) and Northern at $21@21.50. Lake Superior charcoal is a trifle weak at $26.50@27.

Coke continues firm, with 72-hour Connellsville at $5.90 and other grades 25@50c. less.

Cleveland

Oct. 1—The pig-iron market is characterized by a stronger demand for foundry spot and early shipments, indicating that the trade is taking on more business. A large sale of No. 2 foundry is reported for spot shipment at $22.25 f.o.b. The following prices are quoted for the balance of the year: Bessemer $22.90; No. 1 foundry, $22@22.50; No. 2 $21.50@22; No. 3 $20.50@21.50; No. 2 Southern $22.85; gray forge $20@20.50.

Philadelphia

Oct. 2—The development of the past few days in basic and forge iron in this territory have upset the theories and calculations of a few pig-iron people, both sellers and buyers. Large contracts have just been placed for basic, with deliveries to begin not later than Nov. 1. The buyers have covered up to May 1, but not fully, leaving a few gaps to be filled in later. The prices are quite satisfactory to buyers. Forge iron has also been freely contracted for by two or three concerns. Foundry promises to be more active, to judge by the inquiries. Business in a small way has been done on a basis of $20.50@21 for No. 2X foundry, and $18.50 for gray forge. Basic transactions of moment have been closed at $18.50@19; low phosphorus is $27.50.

Steel Billets—Most of the past week's business has been done at $31@31.50 for quick delivery. Forging steel is dragging at present at $34.50.

Bars—Quite a good business was done this week at 1.80c. for best refined. Premium prices are still the rule on steel bars. A large amount of business is now pending in common iron.

Sheets—Large purchases of raw material have been made in view of the practical exhaustion of stocks.

Pipes and Tubes—Merchant pipe is dull; that is, very few orders have been booked. Prices are shaded, or would be if large lots were wanted.

Plate—The heavy increase in orders for steel cars has affected the industry favorably. Bridge work is also appearing in sight, but no large orders have as yet materialized.

Structural Material—Our mills are taking on new business constantly, though not in big lumps. Prices do not vary.

Steel Rails—A good business has been done in light rails.

Scrap—Each week makes the scrap men wear shorter faces. They have been dumpy for some time. Many sales have been made during the past week. No. 1 steel scrap is held at $16.50; railroad scrap at $18; machinery cast at $18 per ton.

Pittsburg

Oct. 1—The outlook in the iron and steel trade at the opening of the fourth quarter is not particularly encouraging. Dullness continues in all of the finished lines and consumers of pig iron do not appear anxious to place any additional orders at the prices now being quoted. Despite the absence of new business there has not been any slump in prices and quotations in all of the finished lines remain unchanged. The only really weak spot is in sheets. While there is but little new business going, the mills continue active, as specifications on old contracts are coming in satisfactorily, and with some exceptions they will be kept busy for a month or two with orders on hand. It is known that some fairly large orders in different lines are being withheld in anticipation of lower prices, but so long as there are unfilled orders on the books it is evident the mills do not intend to make any change. So far there is no indication when official announcement will be made as to the settlement of specifications and prices for standard steel rails for next year. One or two large railroads have already reserved tonnage.

Pig Iron—No transactions have been noted in bessemer pig iron for more than two weeks. The last sale of importance was the purchase of 5000 tons by the Jones & Laughlin Steel Company at $22, Valley furnaces. The monthly average of September sales was announced today at $22, the same as the August average. Sales of lots of less than 1000 tons are not included in the average, and the purchase of 6500 tons by a dealer at less than that figure was not included, as the iron was applied on contracts taken at a higher price. Foundry iron is dropping, although some of the Valley furnaces refuse to take any orders at some of the low prices named. The Westinghouse Electric and Manufacturing Company last week bought 500 tons of No. 2 foundry at a price said to be less than $20.60, Pittsburg. It was not Valley iron, but the price was equal to $19.70, Valley. The market for foundry iron is nominally $21, Valley, or $21.90, Pittsburg, for No. 2. It is likely some furnaces would shade this price on a good order for fourth-quarter delivery. Basic and gray forge are quoted at around $20, Valley furnace, but one large producer insists that $21 is the minimum price for basic iron. The scarcity of bessemer ore is becoming serious and may have the effect of increasing the price of bessemer pig iron. All the large producers seem to be well provided, but merchant furnaces will suffer.

Steel—The billet market is easier and there seems to be a fair supply. The Carnegie Steel Company, through the United States Steel Products Export Company, has sold 5000 tons of bessemer billets to the German syndicate which, it is reported, will be applied to British contracts which could not be filled by the German mills. Bessemer billets are quoted at about $29 and open-heath at about $31. Plates remain at 1.70c. and steel bars at 1.60c.

Sheets—The sheet market is extremely dull and prices of black sheets are being shaded by some mills about $2 a ton. Prices remain unchanged, black sheets being quoted at 2.60c. and galvanized at 3.75c. for No. 28 gage.

Ferro-Manganese—There is no change in the market, but it seems that lower prices will be quoted shortly. The latest sale was at $58 per ton for prompt delivery.

Metal Market

NEW YORK, Oct. 2.

Gold and Silver Exports and Imports

At all United States Ports in Aug. and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Aug. 1907..	$ 4,596,262	$ 3,196,161	Exp. $ 1,400,101
" 1906..	598,078	7,972,868	Imp. 7,374,790
Year 1907..	48,375,360	28,075,590	Exp. 20,299,770
" 1906..	33,511,040	80,344,979	Imp. 46,833,939
Silver:			
Aug. 1907..	6,748,085	4,678,879	Exp. 2,069,206
" 1906..	4,049,173	2,776,976	" 1,272,197
Year 1907..	41,922,336	30,461,715	" 11,460,621
" 1906..	41,847,028	29,731,510	" 12,115,518

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York

For week ending Sept. 28 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 2,000	$ 76,646	$ 1,138,859	$ 53,242
1907.....	32,555,587	7,764,483	39,410,773	2,077,244
1906.....	5,964,713	74,970,741	42,694,365	1,601,752
1905.....	32,289,843	3,090,535	26,424,821	3,557,334

Exports of gold for the week were to the West Indies; of silver chiefly to London. Imports for the week, both gold and silver, were from the West Indies, Panama and Mexico.

Specie holdings of the leading banks of the world, Sept. 28, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$198,807,900
England.....	$193,843,335	.....	193,843,335
France.....	557,579,770	$192,686,060	750,265,830
Germany	171,610,000	47,555,000	219,165,000
Spain..	77,715,000	128,890,000	206,605,000
Netherlands....	30,192,500	26,970,500	57,163,000
Belgium.....	15,936,665	7,963,335	23,900,000
Italy.....	172,320,000	23,898,000	196,218,000
Russia.....	606,435,000	31,930,000	638,365,000
Aust.-Hungary.	226,915,000	60,395,000	287,310,000
Sweden.....	21,240,000	.....	21,240,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports. The European statements are from the cables to the *Commercial and Financial Chronicle* of New York.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	$0.51⅞	$0.54
Peruvian soles and Chilean.....	0.47	0.49
Victoria sovereigns.....	4.85	4.87
Twenty francs.	3.87	3.92
Spanish 25 pesetas.....	4.78	4.80

Silver prices have not been very well maintained during the past week owing to rumors of insufficient rain in India and to lack of buying orders from the East.

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Sept.-Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
26	4.8540	67⅜	31⅛	30	4.8545	67⅛	31 3/16
27	4.8535	67⅛	31 3/16	1	4.8565	66⅞	30⅞
28	4.8525	67⅜	31⅛	2	4.8575	66¾	30 13/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

Sept.-Oct.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
26	14⅞ @15½	14⅛ @14⅞	66⅝	36¼	4.75	5.25 @5.30	5.10 @5.15
27	14⅞ @15⅛	14⅛ @14⅞	65	35¾	4.75	5.25 @5.30	5.10 @5.15
28	14¾ @15	14⅜ @14⅝	.....	35¾	4.75	5.30 @5.35	5.15 @5.20
30	14¾ @15	14⅜ @14⅝	64	35¼	4.75	5.30 @5.35	5.15 @5.20
1	14¾ @15	14¼ @14⅜	63½	35½	4.75	5.35 @5.40	5.20 @5.25
2	14¾ @15	14¼ @14⅜	61¾	34⅝	4.75	5.35 @5.40	5.20 @5.25

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electroytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—There has been quite a falling off in the volume of business as compared with the previous week. Buyers who had been waiting for the 15c. price to place some of their orders are now again content to look on and restrict their purchases to a most exacting hand-to-mouth basis. On this account, the copper which is offering outside of the largest selling interest did not find a ready market and concessions have been growing as time passed. The close is easy at 14¾@15c. for Lake copper; 14¼@14½ for electrolytic in ingots, cakes and wire bars; 14@14¼c. for casting copper.

The standard market in London displayed marked weakness and yielded rather rapidly under heavy selling orders. The close is weak at £61 15s. for both spot and three months.

Statistics for the second half of September show a decrease in the visible supplies of 600 tons.

Refined and manufactured sorts we quote: English tough, £61; best selected, £68; strong sheets, £74.

Exports of copper from New York and Philadelphia for the week were 3950 long tons. Our special correspondent gives the exports from Baltimore for the week at 367 tons of copper.

Copper Sheets—The base price of copper sheets is now 20c. per pound.

Copper Wire—The base price of copper wire, No. 0000 to No. 8, is now 16¼c. per pound.

Lead—The price of the American Smelting and Refining Company for desilverized remains 4.75c., New York, and 4.67½c., St. Louis, and deliveries continue to be made under contract on that basis, but independent producers continue to sell at concessions, 4.65c. and as low as 4.55c., New York, having been accepted.

For the purpose of restricting production, the Federal Lead Company has closed down all its mines and mills, except one, in the southeastern Missouri district. The St. Joseph Lead Company, St. Louis Smelting and Refining Company, and other producers are operating about as usual. Efforts were made to induce the independent producers to restrict production, but they were unwilling to do so.

The London market continues to be subject to erratic fluctuations which are influenced by the occasional arrivals of consignments from this side and Australia. The close is somewhat lower at £19 5s. for Spanish lead, £19 7s. 6d. for English lead.

St. Louis Lead Market—The John Wahl Commission Company reports as follows: Lead is firm at the late decline. Latest sales here are on basis of 4.50@4.52½c. for prompt and 4.55c. for forward delivery, Missouri brands.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 14: The local price for pig lead on wharf for the past week has been 92.50 reales per quintal, which, with exchange at 28.64 pesetas per £1, is equivalent to £18 1s. 6d. per ton of 2240 lb. Cartagena; silver being quoted at 14.50 reales per ounce. Exports for the week were 352 tons argentiferous and 60 tons desilverized lead to Marseilles; 50 tons desilverized to Liverpool; 468 tons in all.

Tin has had a serious decline in the market in London, which extended to £14 from the close recorded in our last report. Quotations are cabled at £156 10s. for spot, £154 5s. for three months.

The buying by home consumers at the decline was fairly large, both for spot and near-by deliveries. Naturally, in sympathy with the London market, the home market also closes weak and prices are quoted about 34½c. for spot, while futures can be had at correspondingly less.

Statistics for the month of September show an increase in the visible supplies of 600 tons.

Shipments of tin from the Straits in September, as reported by cable, were, in long tons: United States direct, 345; Great Britain, 2770; European continent, 790; total 3905. This is a decrease of 1035 tons, as compared with September of last year.

Spelter—A large volume of business took place at advancing prices, and it is reported that the stocks which have been in the smelters' hands have been largely distributed. Consumption for galvanizing purposes is said to be as heavy as at any time. The brass manufacturers' requirements are very low and, as with copper, they have not been in the market for spelter for some months past. Any change from this quarter can only be for the better. The market closes firm at 5.35@5.40c. New York, 5.20@5.25c. St. Louis.

The London market is holding its own and the close is cabled at £21 for good ordinaries, £21 5s. for specials.

Zinc Sheets—The base price is now $7.50 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru, in 60-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 lb.

Antimony—The market, both here and abroad, is strong, and prices advanced this week on reports from Europe of an increased demand for the metal. Cookson's has again regained its leadership in price over the other brands. Quotations are 12c. for Cookson's; 11c. for Hallett's, and 10¼@10¾c. for ordinary brands.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

Quicksilver—This metal is a little firmer. Current prices in New York are $40.50 per flask of 75 lb. for lots of 100 flasks or over. For smaller orders prices run up, according to size and conditions, reaching $55@57 for retail lots. San Francisco quotations are $37.50@39 per flask for domestic business, and $36@37 for export. The London price is £7 7s. 6d. per flask.

Platinum—There is no change in the platinum market and prices remain the same as last week. Hard metal is quoted at $30, ordinary at $27.50 and scrap at $23 @24 per troy ounce.

Missouri Ore Market

Joplin, Mo., Sept. 28—The highest price reported paid for zinc was $43 per ton, the assay base price ranging from $38 to $41 per ton for medium and high-grade ores, with some inferior grades selling as low as a $35 base price. The average price is $39.82. The highest price reported paid for lead is $55, and the average price, all grades, is $51.68 per ton.

The restriction movement was brought

to a close tonight, by the decision of a mass meeting of producers held last night. It was claimed at this meeting that the production had been reduced 16,000 tons during September, and there was a general belief that the movement had been highly beneficial, attention being drawn to the advancing spelter market, which, it was claimed, would soon result in higher ore prices. Scarcity of miners will now prevent the output from reaching unduly large proportions.

Following are the shipments of zinc and lead from the various camps of the district for the week ending Sept. 28:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,552,750	185,970	$58,349
Webb City-Carterville	1,313,310	479,050	39,377
Duenweg	789,710	77,830	17,856
Alba-Neck City	733,970	.....	15,780
Galena	740,370	38,330	15,395
Oronogo	632,370	.....	12,888
Badger	513,000	.....	10,773
Granby	500,000	40,000	6,600
Spurgeon	229,780	66,930	5,219
Sarcoxie	179,520	.....	3,590
Prosperity	125,550	37,070	3,536
Aurora	164,990	.....	3,300
Zincite	63,330	4,300	1,442
Cave Springs	61,950	3,450	1,294
Reeds	48,540	.....	970
Totals	8 649,140	932,930	$196,369
Nine months	451.712.670	68,315,280	$12.851,113

Zinc value, the week, $172,257; 9 mos, $10,311,936
Lead value, the week, 24,112; 9 mos, $2,539,177

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45.98	May	78.40	79.56
June	43.83	44.82	June	80.96	73.66
July	43.25	45.79	July	74.31	58.18
August	43.56	43.22	August	75.36	59.54
September	42.58	40.11	September	79.64	53.52
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Wisconsin Ore Market

Platteville, Wis., Sept. 28—Ore sales and shipments out of this district for the week continued light, no one camp making an average tonnage shipment. The price of 60 per cent. zinc ore ruled at $40; no sales of lead ore were recorded for the week and but one carload of lead was sent out, price of which was based on the market for the previous week.

The meeting of delegates representing the various lead and zinc mining camps of Wisconsin, Iowa and Illinois, which was held at Mineral Point, Wis., Sept. 27, was well attended by prominent mining men and resulted in the organization of the Tri-State Mining Association. The object is to promote the interests of the lead and zinc industries of this section by encouraging education in practical and scientific mining, by acquiring and disseminating trustworthy information bearing upon the development of the mineral resources of the three States named and by promoting a spirit of coöperation among members. A constitution was adopted and plans made for a permanent organization. Election of officers was deferred until the next regular meeting, which will be held at Platteville, Oct. 25, in order to allow ample time for considering the proper men for officials. The question of wages was discussed, but no action taken as to fixing a uniform scale. The question of curtailing the output of ore did not come up for definite consideration.

Ore shipments for the week ending Sept. 28 were:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Galena	297,800	....	.....
Benton	427,280	81,670	.....
Cuba City	87,000	.....	.....
Rewey	56,000	.....	.....
Livingston	60,000	.....	.....
Platteville	148,000	.....	.....
Total for week	1,076,080	81,670	.....

Owing to condition of the wires and lack of railroad connections full returns could not be obtained.

Chemicals

New York, Oct. 2—The general market is fairly steady and considerable business is being done along nearly all lines. The market for metallic salts is still in an unsettled condition.

Copper Sulphate—Buying is not very active and is principally for the immediate needs of consumers. The largest producer quotes $6.50 per 100 lb. for carload lots and $6.75 for smaller quantities, but the salt can be bought from independent dealers as low as $6 for large quantities.

Nitrate of Soda—The market is quiet at present, but prices hold firm and the demand is good. Shipments from the West Coast continue up to normal. Prices are quoted as follows: For spot delivery, 95 per cent., 2.45c.; 1908 delivery, 2.45@ 2.50c.; 1909 delivery, 2.40c. The 96 per cent. grade sells 5c. higher for all deliveries.

British Chemical Trade—Exports of heavy chemicals from Great Britain for the eight months ended Aug. 31 were as follows, in cwt. of 112 lb. each:

	1906.	1907.	Changes.
Bleaching powder	642,576	696 398	I. 53,822
Muriate of ammonia	79,243	111,098	I. 31 855
Soda ash	1,065,834	1,422,301	I. 356.467
Bicarbonate of soda	256,773	304,055	I. 47,282
Caustic soda	1,035,888	973 885	D. 62,003
Soda crystals	114,525	119.680	I. 5,155
Soda sulphate	584,089	637.984	I. 53,905
Sulphuric acid	59 420	54.677	D. 4,743

Exports of copper sulphate were 39,808 long tons in 1906, and 40,918 tons in 1907; an increase of 1110 tons.

Imports of chemicals and raw materials into Great Britain for the eight months ended Aug. 31 were as follows, in long tons:

	1906.	1907.	Changes.
Nitrate of potash	151,277	155 583	I 4,306
Nitrate of soda	77,958	91,737	I. 13,779
Phosphates	308,814	358 502	I. 49.688
Sulphur	20,091	12.345	D. 7,746
Pyrites	509,549	521,219	I 11,670

Estimating the sulphur contents of pyrites, the total imports of sulphur were 223,911 tons in 1906, and 220,833 in 1907; a decrease of 3078 tons.

Mining Stocks

New York, Oct. 2—The stock market is still marked by alternations of small advances and depressions, generally resulting from professional dealings. The close shows slight advances, largely due to covering of shorts. Amalgamated Copper sold down to $57½, recovering to $59½. American Smelting common brought $87; United States Steel $88¾ for the preferred and $27½ for the common.

The curb market was dull and rather heavy, with a slight recovery at the close. In the copper stocks the heavier dealings were in Butte Coalition, which closed at $15½. Cumberland Ely sold at $6½, Greene-Cananea at $8½. There was some activity in the Cobalt stocks, Nipissing closing at $6½ and Cobalt Central at 28½c. per share.

The reduction of the Anaconda quarterly dividend from $1.75 to $1.25 per share had little effect, as such action had been generally expected.

Boston

Oct. 1—Some improvement is to be noted in the copper share market, although conditions are far from satisfactory. Many stocks have sold well below the lowest of the year during the week, and as yet the situation is not tempting enough to bring buying of any moment. Selling orders of any volume depress stocks to a level from which they easily recover when the pressure is withdrawn. The reduction in the quarterly dividend of the Anaconda from $1.75 to $1.25 is a fair indication, it would seem, of what will happen in the case of the Amalgamated.

Amalgamated broke its previous low record last week, touching $56.37½ here. The final today was $60. Copper Range fell $3.50 to $55, but is back to $58.50 again tonight, and North Butte fell $4 to $44.50, recovered to $49 today. Mohawk suffered the worst decline on free offerings of the stock with no demand or support. From the close a week back at $57, it broke to $47.50, with subsequent recovery to $52. Calumet & Hecla has really been the exception, rising $29 to $650 per share, with subsequent reaction to $625, and the close tonight $5 above this.

Balaklala yielded $1 to $5 on steady liquidation. This company will have to raise additional money with which to complete construction work. Trinity fell to below $13.

Daly-West suffered a $3 drop to $10 on news of a strike among the miners, thus closing down the property.

Curb stocks have been generally heavy during the week.

Los Angeles, Cal.

Sept. 26—The Los Angeles Mining Stock Exchange has started in business,

the principal basis being the stock of the Southern Nevada mines. The stocks are classified into mines, preferred prospects and prospects. Those classified as mines must have produced $12,000 net, during the year preceding date of application for listing. Preferred prospects are those favorably located and actively at work. The definition of the prospect is somewhat vague. If the work of the exchange is mainly confined to those defined as mines, the list will not be very long—in fact it will be much shorter than most people would imagine. While the output of Nevada last year was large, the number of mines making the total yield is comparatively small, a few large companies furnishing the bulk of the production.

STOCK QUOTATIONS

NEW YORK	Oct. 1
Name of Comp.	Clg
Alaska Mine	....
Am.Nev.M.&P.Co.	....
Amalgamated	60
Anaconda	39¼
Balaklala	5½
British Col. Cop.	6
Buffalo Cobalt	....
Butte & London	....
Butte Coalition	15¼
Butte Cop. & Zinc.	....
Cobalt Contact	....
Colonial Silver	1⅛
Cum. Ely Mining.	6⅜
Davis Daly	8
Dominion Cop.	3
El Rayo	2¼
Foster Cobalt	.64
Furnace Creek	⅛
Giroux Mine	4⅞
Gold Hill	1⅛
Granby, New	....
Greene Gold	1
Greene G. & S	⅞
Greenw'r & D.Val.	.75
Guanajuato	3⅛
Guggen. Exp.	180
Hanapah	.35
McKinley Dar.	¾
Micmac	3¼
Mines Co. of Am.	1⅜
Mitchell Mining.	1⅜
Mont.Sho. C.(New)	6⅜
Nev. Utah M. & S	3⅛
Newhouse M. & S.	9
Nipissing Mines.	6½
Old Hundred	2½
Silver Queen	⅛
Stewart	⅞
Tennessee Cop'r.	29½
Union Copper	1
Utah Apex	5¾
West Columbus	.11

N. Y. INDUSTRIAL	
Am. Agri. Chem.	....
Am. Smelt. & Ref	87½
Am. Sm. & Ref., pf.	96⅛
Bethlehem Steel	....
Colo. Fuel & Iron.	19¼
Federal M.& S., pf.	....
Inter. Salt	12
National Lead	48
National Lead, pf.	....
Pittsburg Coal	....
Republic I. & S	20⅛
Republic I.& S., pf.	72
Sloss-Sheffield	44½
Standard Oil	445
Tenn. C. & I.	....
U. S. Red. & Ref.	....
U. S. Steel	27⅜
U. S. Steel, pf.	89
Va. Car. Chem.	....
Va. I. Coal & Coke	....

ST. LOUIS	Sept. 28	
N. of Com.	High.	Low.
Adams	.30	.20
Am. Nettie	.04	.03
Center Cr'k	2.25	2.00
Cent. C. & C.	68.00	67.00
C.C. & C. pd.	79.00	78.00
Cent. Oil	110.00	100.00
Columbia	4.00	2.00
Con. Coal	27.00	25.00
Doe Run	135.00	125.00
Gra. Bimet.	.35	.30
St. Joe	15.00	14.00

BOSTON	Oct. 1
Name of Comp.	Clg.
Adventure	....
Allouez	....
Am. Zinc	27¼
Arcadian	....
Atlantic	9¾
Bingham	9
Boston Con	16¼
Calumet & Ariz	109
Calumet & Hecla*	630
Centennial	....
Con. Mercur	.36
Copper Range	58½
Daly-West	10
Franklin	8½
Greene—Can	8⅝
Isle Royal	15¾
La Salle	10½
Mass	....
Michigan	10
Mohawk	51
Mont.C.&C.(new)	....
Nevada	....
North Butte	48¾
Old Colony	....
Old Dominion	24¾
Osceola	92
Parrot	13
Phoenix	....
Quincy	80
Rhode Island	3
Santa Fe	2¼
Shannon	10¾
Tamarack	....
Trinity	13½
United Cop., com.	....
U. S. Oil	8⅞
U. S. Smg. & Ref.	37½
U.S.Sm.& Re.,pd	37
Utah Copper*	35⅝
Victoria	....
Washington	....
Winona	....
Wolverine*	110
Wyandotte	....

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	....
Black Mt.	5¼
East Butte	5½
Hancock Con.	6⅛
Keweenaw	....
Majestic	1⅜
Raven	.90
Shawmut	.30
Superior	9
Superior & Pitts.	9⅞
Troy Man	1

LONDON	Oct. 2		
Name of Com.	Clg.		
Dolores	£1	3s	9d
Stratton'sInd.	0	2	6
Camp Bird	0	18	0
Esperanza	2	0	7½
Tomboy	1	8	1½
El Oro	1	5	0
Oroville	0	16	0
Somera	....		
Utah Apex	0	13	9
Ariz.Cop.,pfd.	2	9	2
Ariz.Cop.,def.	....		

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO	Sept. 26
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.38
Best & Belcher	.86
Caledonia	.49
Challar	.23
Con. Cal. & Va	.82
Crown Point	.34
Exchequer	.35
Gould & Curry	.24
Hale & Norcross	1.00
Mexican	.64
Ophir	1.50
Overman	.13
Potosi	.14
Savage	.85
Sierra Nevada	.63
Union	.55
Utah	.06
Yellow Jacket	1.55
TONOPAH STOCKS	
Golden Anchor	.10
McNamara	.32
Montana-Pitts.ex.	.07
North Star	.18
Rescue	.10
GOLDFI'D STOCKS	
Black Ants	.06
Blue Bull	.28
Columbia Mt.	.37
Comb. Frac.	1.75
Conquerer	.09
Daisy	1.07
Florence	3.95
Frances-Mohawk	.95
Goldfield Con.	6.82
Grandma	.12
Great Bend	.48
Red Hills	.41
St. Ives	.68
BULLFROG STOCKS	
Amethyst	.16
Bonnie Claire	.38
Mayflower Con.	.32
Montgomery Mt.	.09
Original	.04
MANHAT'N STOCKS	
Gold Wedge	.10
Manhattan Mg.	.06
Pine Nut	.06
Ruby Wonder	.23
Stray Dog	.10
Yellow Horse	.04

NEVADA (Weir Bros. & Co., New York)	Oct. 2
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	10.00
Tonopah Exten.	1.50
Montana Tonop'h	2.05
Belmont	2.00
Tonopah Midway	.74
West End Con.	.57
Jim Butler	.60
GOLDFI'D STOCKS	
Sandstorm	.32
Kendall	.20
Red Top	3.00
Jumbo	3.00
Goldfield Mining.	1.20
Dia'dfield B. B. C.	.18
Atlanta	.29
Mohawk	15.00
Silver Pick	.36
Laguna	1.20
BULLFROG STOCKS	
Mont. Shoshone C.	6.00
Tramps Con.	.24½
Gold Bar	.43
Bullfrog Mining	.10
Bullfrog Nat. B.	.12
Homestake Con.	...
MANHAT'N STOCKS	
Manhattan Con.	.34
Manhat'n Dexter.	.09
Jumping Jack	.10
Stray Dog	.10
Indian Camp	.06

COLO. SPRINGS	Sept. 28
Name of Comp.	Clg.
Acacia	....
Black Bell	....
C. C. Con	4½
Daute	4¾
Doctor Jack Pot.	6
Elkton	50
El Paso	38
Findlay	42
Gold Dollar	6⅞
Gold Sovereign	3½
Isabella	21¼
Index	....
Jennie Sample	....
Jerry Johnson	....
Mary McKinney	42
Pharmacist	3½
Portland	115
Un. Gold Mines	6
Vindicator	80
Work	15½

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Agri. Chem., pfd.	Oct. 15	$3.00	$544,590
Am. Sm'g & Ref. Co., com.	Oct. 1	2.00	1,000,000
Am. Sm'g & Ref. Co., pfd.	Oct. 1	1.75	875,000
Central C. & C., com.	Oct. 15	1.50	76,875
Central C. & C., pfd.	Oct. 15	1.25	23,438
Col. & Hocking C. & I., pf.	Oct. 1	1.50	103,866
Copper Range Con.	Oct. 1	2.00	767,562
Esperanza	Oct. 1	1.37½	625,625
Frances Mohawk	Oct. 1	0.10	91,000
Guggenheim Expl.	Oct. 1	2.50	262,500
Inter. Nickel, pfd.	Nov. 1	1.50	131,123
Kendall	Sept. 24	0.02	10,000
New Idria	Oct. 1	0.20	20,000
Nipissing	Oct. 21	0.15	180,000
Oroville	Oct. 9	0.12½	87,500
Pennsylvania Salt	Oct. 15	3.50	210,000
Philadelphia Gas. com.	Nov. 1	0.75	434,296
Pioneer, Alaska	Oct. 10	3.00	150,000
United Metals Selling	Nov.	7.50	375,000
U. S. Reduction & Ref., pfd.	Oct. 1	1.50	59,187
U. S. Smg., Ref. & Mg., com.	Nov. 1	0.87½	304,646
U. S. Smg., Ref. & Mg., pfd.	Nov. 1	0.87½	656,259
Utah Con	Oct. 15	1.00	300,000
Va. Car. Chem., pfd	Oct. 15	2.00	360,000
Wolverine	Oct. 14	7.50	450,000
Work	Oct. 1	0.01	15,000

Assessments

Company.	Delinq.	Sale.	Amt.
Belcher, Nev.	Sept. 18	Oct. 9	$0.10
Birchville, Cal.	Oct. 2	Oct. 23	0.02
Emerald, Utah.	Dec. 14	Jan. 11	0.01½
Etna-King, Cal.	Sept. 15	Oct. 15	0.02
Helios, Cal.	Sept. 17	Oct. 15	0.02
Herkimer Gravel, C.	Oct. 7	Dec. 28	0.03
Imlay, Nev.	Sept. 26	Oct. 16	0.01
Jenny Lind, Cal	Sept. 30	Oct. 15	0.05
Lucky Dutchman, N.	Oct. 5	Oct. 28	0.01
McMillen, Cal.	Sept. 23	Oct. 28	0.03
Nassau Cop., Cal.	Sept. 16	Oct. 14	0.10
Nevada-Fairview	Sept. 23	Oct. 28	0.02
Occidental Con., N.	Oct. 3	Oct. 28	0.10
Oro Cobre, Cal.	Sept. 24	Oct. 14	0.02½
Peruvian Con., Utah	Oct. 1	Oct. 16	0.01½
Posey Canyon, Cal.	Oct. 5	Oct. 26	0.01
Savage, Nev.	Sept. 26	Oct. 17	0.10
Sheba G. & S., Utah.	July 30	Nov. 2	0.10
Yellow Jacket, Nev.	Sept. 23	Oct. 30	0.15
Zelbright, Cal.	Oct. 12	Oct. 29	0.05

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.326
April	64.765	65.462	29.984	30.253
May	66.976	65.981	30.968	30.471
June	65.394	67.090	30.185	30.893
July	65.105	68.144	30.113	31.366
August	65.949	68.745	30.529	31.637
September	67.927	67.792	31.483	31.313
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	24.048	18.724	25.072	84.867	102.375
June	18.442	22.665	18.719	24.140	83.994	97.272
July	18.190	21.130	18.585	21.923	81.167	95.016
August	18.380	18.356	18.706	19.255	83.864	79.679
September	19.033	15.565	19.328	16.047	87.831	68.375
October	21.203	.....	21.722	.....	97.269	.....
November	21.833	.....	22.398	.....	100.270	.....
December	22.885	.....	23.350	.....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	41.091
February	36.403	42.102	August	40.606	37.667
March	36.662	41.313	September	40.516	36.689
April	38.900	40.938	October	42.852	.....
May	43.313	43.149	November	42.906	.....
June	39.260	42.120	December	42.750	.....
			Av. year.	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	6.000	16.725	19.688
June	5.750	5.760	16.813	20.188
July	5.750	5.288	16.525	20.350
August	5.750	5.250	17.109	19.063
September	5.750	4.833	18.266	19.775
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

MONTH.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.006	6.419	5.948	6.269	27.728	24.469
July	6.006	6.072	5.856	5.922	26.800	23.850
August	6.027	5.701	5.878	5.551	26.938	21.969
September	6.216	5.236	6.056	5.086	27.563	21.050
October	6.222	.....	6.070	.....	28.075	.....
November	6.375	.....	6.225	.....	27.781	.....
December	6.593	.....	6.443	.....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	.....

New York and St .Louis, cents per pound. London in pounds sterling per long ton.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.01½@.02½
Grains	"	.03½@.04½
Naxos flour	"	.01½@.02½
Grains	"	.03½@.04½
Chester flour	"	.01½
Grains	"	.03½@.04½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½@.01½
Grains, in kegs	"	.02½@.02½
Garnet, per quality	sh ton	25.00@35.00
PumiceStone, Am., Powd.	100 lb.	1.60@2.00
Italian, powdered	"	.01¾@.01½
Lump, per quality	"	.03@.20
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.05@.25
Rouge, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07¾@.07¾
ACIDS—		
Acetic 28%	lb.	.02¼@.02¾
Boric	"	.09¾@.10
Hydrofluoric, 30%	"	.02¾@.03
" 48%	"	.06
" 60%	"	.10
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½c.
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		18 00
Oxalic	"	.08¼@.08½
ALCOHOL—Grain	gal.	2.46¾
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	.04¼
ALUMINUM—Sulphate, com'l.	"	1.25@1.60
AMMONIA—24 deg.	lb.	.04¼@.05¼
" 26 " "		.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.07½@.08
Muriate grain	"	.05¾@.06½
Lump	"	.09½@.09¾
Sulphate, 100 lb		3.07½@3.10
Sulphocyanide com	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lump	lb.	.07½@ 08
ARSENIC—White	"	.06¾@.07¼
Red	"	.07½@.07¾
ASPHALTUM—		
Barbadoes	per ton	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.14@.18
Gilsonite, Utah ordinary	per ton.	35.00
Trinidad	"	30.00@32.50
California	"	22.50@30.00
BARIUM—		
Carb. Lump, 80@90%	lg. ton.	30.00@35.00
Powdered 80@90%	lb.	.02@.02½
Chloride com'l	ton.	40.00 up
Nitrate, powdered, in casks	lb.	.05½@.06
Blanc Fixe	per lb.	.02¾
BARYTES—		
Am. Ground	sh. ton.	14.00@21.00
Floated	"	22.00
Foreign floated	"	19.50@22.50
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%,	100 lb.	1.25@1.40
BLUE VITRIOL—(copper sulphate), carload, per 100 lb		6.00
BONE ASH	lb.	.02½@.04
BORAX	"	.07½@.08
CALCIUM—Acetate, gray	"	2.50@2.55
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y. for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	14.75@19.75
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.50@20.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	8.50@9.00
Foreign	"	11.50@17.50
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.75
In bags	"	.60@.70
CRYOLITE	lb.	.06½@.06¾
FELDSPAR—Ground best	sh. ton.	14.00
FIRE BRICK—		
American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis No. 1	"	18.00
" No. 2	"	15.00
Extra	"	20.00@23.00
FIRE CLAY—F. o. b. St. Louis.		
St. Louis, extra quality	per ton	5.00
" ordinary	"	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	lg. ton.	8.00@10.00
Ground	"	11.50@13.50
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump,	100 lb.	.80@.85
Powdered	"	.80@.85
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—		
Fertilizer	sh. ton.	7.00
Powdered	sh. ton.	12.00@20.00
INFUSORIAL EARTH—		
Ground Am. best	lb.	.01¾
French	lg. ton.	56.00
German	lb.	.02½@.02⅝
LEAD—Acetate (sugar of) brown	lb.	.07¾
Nitrate, com'l	"	.09@.09¼
MAGNESITE—Greece.		
Crude (95%)	g. ton.	7.00@8.00
Calcined, powdered	sh. ton.	35.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.80@1.15
Sulphate (Epsom salt)	100 lb.	.90@1.00
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01¼@.01¾
75@85% binoxide	"	.01½@.02
85@90% binoxide	"	.01¾@.05
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	35.00@60.00
MARBLE—Flour	h. ton.	9.50@10.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, nominal	lb.	.08 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb,	.11@.18
" double	"	.08@.10
NITRATE OF SODA—100 lb. 95% for '07		2.45
95% for 1908		2.45@2.50
95% for 1909		2.40
96% is 5c higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.07½@.07¾
English glassmakers'	"	.08½@.08¾
Lithopone	"	.03¾@.07
Metallic, brown	sh. ton.	16.50@22.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.26
Red lead, American	"	.07½@.07¾
Foreign	"	.08¼@.08½
Turpentine, spirits bbl.	per gal.	.54@.54½
White lead, Am., dry	lb.	.06½@.07
American, in oil	"	.07½@.07½
Foreign, in oil	"	.10¼@.10¾
Zinc white, Am. extra dry	"	.06½@.05½
Foreign, red seal, dry	"	.07½@.07¾
Green seal, dry	"	.08¼@.08½
PHOSPHATES—Acid	65@67½c	per unit
*Fla., hard rock		10.25@10.50
land pebble 68%		5.75@6.00
†Tenn., 78@80%		6.50@7.00
75%		6.00@6.25
68@72%		4.00@4.25
‡So. Car. land rock		5.75@7.25
" " river rock		
POTTASSIUM—		
Bicarbonate crystal	lb.	$.08½@.09
Powdered or granulated	"	.09@.09½
Bichromate, Am	"	.08¾@.09
Scotch	"	.11
Bromide	"	.15½@.16
Carbonate (80@85%)	"	.03½@.03¾
Caustic, ordinary	"	.04½@.05½
Elect. (90%)	"	.05½@.06
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.09½@.09½
Crystals	"	09@09½
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	.09½@.10
Prussiate, yellow	"	.15½@.16
Red	"	.33@.35
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. mines	per unit	11@11½c
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported non-arsenical, furnace size, per unit		.14@.14½
Imported, arsenical, furnace size, per unit		.13@ 13½
Imported fines, arsenical, per unit		.08½@.09
" " non-arsenical, per unit		10½@11c.

Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.

SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.10
N. Y. agricultural	sh. ton.	3@4.40
SALTPETER—Crude	100 lb.	4.62½@4.75
Refined, crystals	"	5.00@5.25
SILICA—		
Ground quartz, ord'ry	lg. ton	13.00@15.00
Silex	"	13.00@30.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.43½@.45¾
SODIUM—		
Acetate	lb.	.04¼@.04⅜
"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb		1.20@1.50c.
Soda, caustic, per 100 lb., 76/60		1.75@1.85
" " powdered		.02¾@.03½
Salt cake, per 100 lb		.65@.85
Soda, monohydrate, per lb		1.4@1.75c.
Bichromate	lb.	.07½@.07½
Bromide	"	.16
Chlorate, com'l	"	.09@.09½
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.35 up
German	"	1.60@1.70
Phosphate	100 lb.	1.85@2.15
Prussiate	"	.09½@.10
Sal soda, f.o.b. N. Y	100 lb	.65@.70
Foreign, f.o.b. N. Y	"	.80@1.00
Silicate, com'l	100 lb.	.75@1.15
Sulphate, com'l, (Glauber's salt)	100 lb.	.50@.60
" " calcined		.65@.85
STRONTIUM—Nitrate	lb.	.08½@.08¾
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	lg. ton	19.00@19.50
To Philadelphia or Baltimore	"	19.00@19.50
Roll	100 lb.	1.85@2.15
Flour	" "	2.00@2.40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.85@1.00
TALC—Domestic	sh. ton.	15.00@25.00
French	"	20.00@25.00
Italian, best	"	35.00@40.00
TIN—Bi-chloride, 50%	lb	.11¼
Crystals	"	.23¾ up
Oxide, lb		.43@.45
URANIUM—Oxide	"	3.50
ZINC—		
Chloride solution, com'l 20°	"	.02½
Chloride, granular	"	.04¾@.05
Dust	"	.05½@.06
Sulphate	"	.02½@.02½

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

Metal and Mining Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,626,381	July 1907	$ .30
Alaska Treadwell, g.	Al'ka	5,000,000	200,000	25	9,435,000	July 1907	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	306,340	Jan. 1907	0.30
Amalgamated, c	Mont	155,000,000	1,830,879	100	53,646,546	Aug. 1907	2.00
Am.Sm.&Ref.,com.	U. S.	50,000,000	800,000	100	11,625,000	Oct. 1907	2.00
Am. Sm. & Ref. pf.	U. S	50,000,000	500,000	100	25,338,053	Oct. 1907	1.75
Am. Smelters, pf. A	U. S	17,000,000	170,000	100	1,940,000	Sept. 1907	1.50
Am. Smelters. pf. B	U. S	30,000,000	300,000	100	3,375,000	Sept. 1907	1.25
Am.Zinc,Lead&Sm.	Kan.	3,750,000	80,000	25	60,000	Aug. 1907	.75
Anaconda,c.	Mont	30,000,000	1,200,000	25	36,950,000	July 1907	1.75
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,051	July 1905	.50
Arizona, c.	Ariz	3,775,000	3,682,520	....	6,182,361	Apr. 1906	.05
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
Bald Butte, g. s.	Mont	250,000	250,000	1	1,354,648	Oct. 1907	.04
Beck Tunnel, g.s.l.	Utah	100,000	1,000,000	0.10	595,000	July 1907	.04
Bingham & N.H.,c.g	Utah	2,000,000	226,000	5	22,600	Sept. 1906	.10
Boston & Montana.	Mont	3,750,000	150,000	25	47,875,000	Nov. 1906	12.00
Bull,Beck.&Cham.g	Utah	1,000,000	100,000	10	2,688,400	Apr. 1907	.10
Bunker Hill & Sull.	Ida	3,000,000	300,000	10	9,486,000	Sept. 1907	.60
Butte Coalition,c.s.	Mont	15,000,000	1,000,000	15	2,300,000	Sept. 1907	.50
Calumet & Arizona	Ariz	2,500,000	200,000	10	9,000,000	Sept. 1907	5.00
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	104,900,000	Sept. 1907	15.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	4,079,500	Aug. 1907	.24
Carisa, c.g.	Utah	500,000	500,000	1	55,000	Nov. 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
Columbus Con. c.	Utah	1,500,000	300,000	5	165,000	July 1907	.20
Combi'tion Co.G'f'd	Nevada	400,000	320,000	1	688,000	Sept. 1906	.15
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,205,000	Dec. 1906	.02½
Continental, z. l.	Mo.	550,000	22,000	25	209,000	July 1907	.50
Copper Range Con.	Mich	38,500,000	383,781	100	6,094,020	Oct. 1907	2.00
Creede United, g.	Colo.	2,000,000	1,625,000	1	214 053	July 1906	.00½
Cripple Creek Con.g	Colo.	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly Judge, g. s. l.	Utah	300,000	300,000	1	225,000	Apr. 1907	.37½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,823,000	Sept. 1907	.60
De Lamar, g. s.	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo.	10,000,000	59,062	100	1,405,506	Sept. 1907	.50
Elkton Con., g.	Colo.	3,000,000	2,500,000	1	1,879,460	June 1907	.01½
El Paso, g.	Colo.	2,500,000	2,450,000	1	1,022,750	June 1906	.01
Fed. Sm., com.	Idaho	10,000,000	60,000	100	2,528,750	Sept. 1907	3.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	3,071,250	Sept. 1907	1.75
Findley, g.	Colo.	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Frances-Mohawk,g	Nevada	1,000,000	910,000	1	323,000	July 1907	0.10
Gemini-Keystone	Utah	500,000	5,000	100	1,950,000	July 1907	10.00
Gold King Con	Colo.	5,750,370	5,750,370	1	1,407,504	May 1905	.01
Grand Central, g.	Utah	250,000	250,000	1	1,320,500	Sept. 1907	.04
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	1,300,000	July 1907	.10
Homestake, g.	S. D	21,840,000	218,400	100	22,244,040	Apr. 1907	.50
HornSilver,g.s.c.s.l	Utah	10,000,000	400,000	25	5,642,000	Sept. 1907	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	917,869	Nov. 1907	1.50
Iron Silver	Colo.	10,000,000	500,000	20	4,100,000	Oct. 1907	.10
Jamison, g.	Cal	3,900,000	390,000	10	278,470	July 1907	.02
Jerry Johnson	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500,000	5	1,130,000	Aug. 1907	.02
Liberty Bell,g. s.	Colo.	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Lower Mammoth, g	Utah	190,000	190,000	1	42,750	Aug. 1907	.07½
Mammoth, g. s. l.	Utah	10,000,000	400,000	25	2,120,000	Oct. 1906	.05
Mary McKinney, g.	Colo.	1,500,000	1,304,252	1	801,765	Apr. 1907	.03
May Day, g. s. l.	Utah	200,000	800,000	25	48,741	Sept. 1907	.01½
Mohawk, c.	Mich	2,500,000	100,000	25	1,400,000	July 1907	5.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	9,437,274	Jan. 1907	15.00
Nevada Hills, s.g.	Nevada	1,000,000	200,000	5	300,000	Sept. 1907	.10
New Century, z., l.	Mo.	300,000	300,000	1	230,300	Aug. 1907	.00½
Newhouse M. & S.c.	Utah	6,000,000	600,000	10	300,000	Aug. 1907	.50
New Idria, q.	Cal	500,000	100,000	5	940,000	Oct. 1907	.20
New Jersey Zinc	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	5,000,000	June 1907	2.00
North Star, g.	Cal	2,500,000	250,000	10	1,486,989	Sept. 1907	.20
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo.	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s.	Neva	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c.	Mich	2,500,000	96,150	25	7,035,650	July 1907	7.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,807,649	Sept. 1907	.25
Pennsylvania, g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Pitts. L. & Z., l.z.	Mo	1,000,000	1,000,000	1	20,000	July 1907	.02
Portland, g.	Colo	3,000,000	3,000,000	1	7,507,080	July 1907	.04
Quartette, g. s.	Nevada	1,000,000	100,000	10	375,000	July 1907	.20
Quincy, c	Mich	3,750,000	110,000	25	17,725,446	Sept. 1907	2.50
Rob Roy, z.	Mo.	15,000	15,000	1	9,600	May 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g, q.	Utah	1,000,000	1,000,000	1	258,000	Nov. 1906	.00½
St. Joseph, l.	Mo.	20,000,000	1,000,000	10	5,408,357	Sept. 1907	.15
Silver Hill, g. s.	Nevada	108,000	108,000	1	81,000	June 1907	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	11,187,500	July 1907	.33½
Shannon, c.	Ariz	3,000,000	300,000	10	450,000	July 1907	.50
Snowstorm, s. l.	Ida	1,500,000	1,500,000	1	360,000	July 1907	.03
Spearfish, g.	S. D	1,500,000	1,500,000	1	165,500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2,000,000	178,600	10	5,139,061	Mar. 1907	.10
Stratton'sIndepend	Colo.	5,500,000	1,000,007	5	4,895,865	Apr. 1906	.12½
Swansea, g. s. l.	Utah	500,000	100,000	5	329,500	Mar. 1907	.05
Tamarack, c.	Mich	1,500,000	60,000	25	9,420,000	July 1907	4.00
Tennessee, c.	Tenn	5,000,000	175,000	25	1,443,750	Aug. 1907	2.00
Tomboy, g. s.	Colo.	1,750,000	300,000	5	900,000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	3,250,000	July 1907	.25
Tonopah Belmont.	Nevada	2,000,000	1,295,007	1	518,003	Apr. 1907	.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway.	Nevada	1,000,000	1,000,000	1	300,000	Jan. 1907	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	150,000	Sept. 1907	.02
United Cop. com.	Mont	75,000,000	450,000	100	5,962,500	Aug. 1907	1.75
United, c. pf.	Mont	5,000,000	50,000	100	1,500,000	May 1907	3.00
United, z. l., pf.	Mo.-Kan.	500,000	19,556	25	293,028	July 1907	.50
United, (Crip'le C'k)	Colo.	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz.	3,000,000	300,000	10	19,260,322	Sept. 1907	.75
Un.States,pf.g.s.c.l*	Utah	37,500,000	750,000	50	3,937,500	July 1907	.87½
U.S. Red. & Ref. Pf.	Colo.	4,000,000	39,458	100	1,005,504	Oct. 1907	1.50
Utah, g.(Fish Sp'gs)	Utah	1,000,000	100,000	10	279,000	Sept. 1907	.03
Utah Con., c.	Utah	1,500,000	300,000	5	7,236,000	Oct. 1907	1.00
Victoria, Utah	Utah	250,000	250,000	1	177,500	Mar. 1907	.04
Vindicator Con., g.	Colo.	1,500,000	1,500,000	1	1,650,000	July 1907	.03
Wolverine, c.	Mich	1,500,000	60,000	25	4,500,000	Oct. 1907	7.50
Work, g.	Colo.	1,500,000	1,500,000	1	105,000	July 1907	.01
YankeeCon	Utah	500,000	500,000	1	157,500	Oct. 1907	.03
Yellow Aster, g.	Cal	1,000,000	100,000	10	958,789	Aug. 1907	.20

*Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S	20,000,000	181,530	100	7,920,460	Oct. 1907	3.00
American Cement	Pa.	2,000,000	200,000	10	1,108,000	July 1907	.40
American Coal	Md	1,500,000	50,000	25	2,367,500	Sept. 1907	1.25
Associated Oil	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	900,000	Nov. 1906	.75
Cambria Steel	Pa.	50,000,000	900,000	50	8,887,500	Aug. 1907	.75
Caribou Oil	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	2,075,625	Oct. 1907	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,312,502	Oct. 1907	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C.& I.pf.	Ohio	7,000,000	69,244	100	279,952	Oct. 1907	1.50
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md	10,250,000	102,500	100	9,109,150	July 1907	1.50
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	2,125,000	June 1907	1.50
Empire S. & I., pf.	N. J.	5,000,000	25,000	100	712,500	July 1907	3.00
Fairmont Coal	W. Va.	12,000,000	120,000	100	1,384,000	Feb. 1907	3.00
Four Oil	Cal	500,000	300,000	1	105,406	July 1905	.01
General Chem. com.	U. S	12,500,000	74,103	100	1,893,331	Sept. 1907	2.00
General Chem., pf.	U. S	12,500,000	100,000	100	4,840,178	Oct. 1907	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
International Salt		30,000,000	182,280	100	927,060	Dec. 1906	1.00
Jeff. & Cl'f C. & I., cm	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf.	Pa.	1,500,000	15,000	100	825,000	Aug. 1906	2.50
Kern River Oil	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	17,378,500	346,901	50	25,614,693	May 1907	2.00
Maryland Coal,pf.	Md	2,000,000	18,850	100	1,592,560	June 1907	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,504,945	July 1907	3.50
Monte Cristo Oil.	Cal	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	2,161,284	Oct. 1907	1.25
National Lead, pf.	N. Y.	15,000,000	149,040	100	16,585,148	Sept. 1907	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md.	1,000,000	50,000	20	350,000	May 1907	.40
New River Coal, pfd.	W. Va.	4,000,000	37,617	100	169,276	Aug. 1907	1.50
Pacific Coast Borax	Cal.	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil	Cal.	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt	Pa	3,000,000	60,000	50	14,738,000	Oct. 1907	3.50
Penna. Steel, pfd.	Pa.	25,000,000	168,214	100	7,615,744	May 1907	3.50
Phila. Gas, com.	Pa	28,953,029	579,061	50	8,050,040	Aug. 1907	.75
Phila. Gas, pf.	Pa	6,000,000	120,000	50	2,550,000	Sept. 1907	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	460,000	May 1907	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	5,330,746	Oct. 1907	1.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	9,480,250	 1907	1.25
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	3,411,750	Oct. 1907	1.75
Standard Oil	U. S	100,000,000	970,000	100	581,022,905	Sept. 1907	6.00
Tenn. C. & I., com.	Tenn	22,553,600	225,536	100	3,357,524	Aug. 1907	1.00
Tenn. C. & I., pf.	Tenn	248,000	2,480	100	385,080	May 1907	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,960,000	June 1907	1.50
Thirty-three Oil.	Cal.	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal.	10,000,000	100,000	100	1,118,766	May 1905	.50
U. S. SteelCorp.,cm.	U. S	550,000,000	5,083,025	100	66,041,541	July 1907	.50
U. S. Steel Corp., pf.	U. S	360,281,100	3,608,141	100	187,454,724	Aug. 1907	1.75
Va. Carolina Ch., pf.	U. S	20,000,000	180,000	100	12,540,869	Oct. 1907	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Buffalo, s.	Ont.	1,000,000	900,000	100	108,000	July 1907	.03
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Coniagas (Cobalt)	Ont.	1,000,000	1,000,000	1	20,000	July 1907	.02
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Consolidated M & S.	B. C.	5,500,000	48,338	100	714,945	Aug. 1907	2.50
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	140,000	25	2,018,648	July 1907	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	2,250,000	July 1907	1.00
Dominion Coal, pf.	N. S	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	3,823,200	July 1907	.37
Esperanza, s. g.	Mex	2,275,000	455,000	5	6,721,649	July 1907	1.32
Foster Cobalt, s.	Ont.	1,000,000	1,000,000	1	50,000	Jan. 1907	.05
Granby Con.	B. C.	15,000,000	135,000	100	2,968,630	Sept. 1907	3.00
Greene Con. Copper.	Mex	8,640,000	864,000	10	5,814,200	Mar. 1907	.40
Greene Con. Gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
GreenGold-Silv'r,pfd	Mex	3,000,000	300,000	10	120,000	Mar. 1907	.40
Guanajuato	Mex	3,000,000	540,000	5	74,250	Oct. 1906	.07½
Guggenheim Exp.	Mex	17,000,000	105,000	100	3,697,500	Oct. 1907	2.50
Kerr Lake, s.	Ont.	3,000,000	600,000	5	390,000	Oct. 1907	.15
LeRoi No. 2, g.	B. C	3,000,000	120,000	25	716,400	Feb. 1907	.24
McKinley-Darragh,s.	Ont.	2,500,000	2,000,000	1	100,000	Mar. 1907	.02
Mexican Coal & Coke	Mex	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex	2,500,000	240,000	10	600,000	Aug. 1907	.50
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,785,000	Sept. 1907	.02
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,322,000	Sept. 1907	.10
Nipissing, s.	Ont.	6,000,000	1,200,000	5	1,320,000	Oct. 1907	.15
North Star	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,876	100	938,228	July 1907	1.50
N. S. St. & Coal, pf.	N. S.	1,030,000	10,300	100	396,550	July 1907	2.00
Penoles*	Mex	250,000	2,500	100	8,263,375	Aug. 1907	20.00
Platanillo	Mex.	500,000	206,989	1	5,580	Sept. 1906	.00½
Reco, g. s. l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Silver Queen, s.	Ont.	1,500,000	1,500,000	1	120,000	Jan. 1907	.08
Slocan Star	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Texuitlan Copper	Mex	1,000,000	10,000	100		Oct. 1907	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,380	Jan. 1905	.48
Tretheway, s.	Ont.	1,000,000	1,000,000	1	80,000	Mar. 1907	.04
Tyee, c.	B. C.	940,000	180,000	5	136,800	Dec. 1904	.24

*Mexican Currency

THE MINING INDEX.

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

We will undertake to furnish a copy of any article (if in print) in the original language, for the price quoted. Where no price is quoted the cost is unknown. These papers are not kept in stock, but must be ordered from the publisher; hence there will be some delay for foreign papers.

No accounts can be opened for these small amounts, but remittance must be sent with order. For the convenience of those making small but frequent remittances, coupons are furnished at the following prices: 20 cents each, six for $1.00, thirty-three for $5.00 and one hundred for $15.00. This arrangement will be especially appreciated by foreign readers and men in distant mining camps. Where remittances are made in even dollars we will return the excess over an order in coupons upon request.

ANTIMONY

4373—SMELTING—Notes on Antimony Smelting. G. Pautrat. (Eng. and Min. Journ., Sept. 14, 1907; 1½ pp.) Translation; of an article in *Revue de Chimie Industrielle*, Mar., 1907, which was previously mentioned in this Index. 20c.

ASBESTOS

4374—PRODUCTION of Asbestos in 1906. J. S. Diller. (Advance Chapter from Mineral Resources of the U. S. Calendar Year 1906; 10 pp.) Reviews the conditon of the asbestos industry in the United States, with statistics of production, and considers briefly conditions in the more important foreign countries.

ASPHALT

4375—PRODUCTION of Asphalt and Bituminous Rock in 1906. J. A. Taff. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 10 pp.) Sums up the present condition of the asphalt industry of the United States, and gives figures of exports and imports as well as of domestic production.

BAUXITE

4376—BAUXITE—Des Gisements de Bauxite. C. Helson. (L'Echo des Mines, Aug. 22, 1907; 1½ pp.) Continuation of article previously mentioned in this Index. 20c.

CEMENT

4377—CEMENT INDUSTRY in the United States in 1906. Prepared under the direction of E. C. Eckel. (Advance chapter from the Mineral Resources of the U. S., Calendar Year 1906; 39 pp.) Contains the usual review of progress in the cement industry during 1906 and also the statistics connected with the production, consumption and foreign trade in cement. 20c.

4378—CEMENT WORKS—Electricity for Cement Plants. J. B. Porter. (Eng. Rec., Sept. 21, 1907; 1½ pp.) Paper read before the Assn. Am. Portland Cement Mfgrs. Points out some of the advantages of electrically operated machinery in cement plants both in respect to economy and flexibility of operation. 20c.

COAL AND COKE

4379 — ANKYLOSTOMIASIS — "Miner's Anemia." F. W. Gray. (Can. Min. Journ., Sept. 1 and 15, 1907; 3 pp.) Conclusion of article previously mentioned in this Index, giving results of investigations into present conditions in Westphalia, Belgium, France and Great Britain, together with the conclusions of the author. 40c.

4380—ARGENTINA—Nota sobre el Carbon de Salagasta. E. H. Ducloux. (Anales de la Soc. Cientifica Argentina, Apr., 1907; 4 pp.) Brief notes on several newly discovered coal deposits in the province of Salagasta in Argentina, with analyses of typical samples.

4381—BITUMINOUS COAL WASHING. G. R. Delamater. (Mines and Min., Sept., 1907; 3½ pp.) Continuation of article previously mentioned in this Index, dealing in this instalment with the design of the washery, the equipment of the plant and principles and characteristics of the more important machines used. 20c.

4382—BROWN COAL MINING—Der Bergwersbetrieb auf dem Braunkohlenvorkommen zwischen Kolzig, Weisswasser, Muskau and Teuplitz in der Niederlausitz unter besonderer Berucksichtigung seines Einflusses auf die Verhutung der Selbstentzundung der Kohle. Riegel. (Glückauf, Sept. 7, 1907; 16½ pp.) Describes the methods of mining soft coal in the above district where special attention must be paid to the prevention of spontaneous combustion of the coal. 40c.

4383—CANADA—Springhill and Its Collieries. W. D. Matthews. (Can. Min. Journ., Sept. 15, 1907; 3½ pp.) Description of the surface and underground workings of the above collieries, together with brief information on the character of the seams worked. 20c.

4384—COAL BURNING—Scientific Use of Soft Coal. G. D. Fowler. (Eng. Journ. of Canada, Sept., 1907; 1 p.) Brief hints as to the proper management of boiler fires and the reasons why certain precautions must be observed in stoking.

4384a—COAL CUTTING—Electricity Applied to Coal Cutting. G. Farmer. (Sci. and Art of Mining, Sept. 21, 1907; 1½ pp.) Contains general information as to construction and capacities of some types of electrically-operated coal cutters of the chain and the disc systems. 20c.

4385—COAL HANDLING—A Modern Electrical Coal Handling Equipment. (Modern Machinery, Sept., 1907; 1½ pp.) Brief descriptive article dealing with some of the noteworthy facts of a modern electrically-operated, coal-handling equipment. 20c.

4386—COAL MINES—La Valeur Moyenne a la Mine des Charbons dans le monde (1885-1905). E. Lozé. (Annales des Mines de Belg., T. XII, 3 livr., 1907; 24 pp.) Compares the output, present value and gives a few speculations as to the future of the principal coal mines of the world.

4387—COAL MINING—The Technics of Coal Mining. G. H. Winstanley. (Min. Engineering, Sept., 1907; 3½ pp.) Continuation of article previously mentioned in this Index, dealing with steam boilers and generating plants for collieries. 20c.

4388 — COAL PURCHASING — The Choice of a Bituminous Coal. R. H. Kuss. (Eng. Rec., Aug. 31, 1907; 1 p.) Deals with the main principles of selecting bituminous coal, with reference to the best fulfillment of a given set of conditions. 20c.

4389 — COAL STORAGE PLANTS, Some Recent Mechanical. W. G. Hudson. (Eng. News, Aug. 29, 1907; 4½ pp.) Detailed descriptions of the equipment and general arrangement of several large plants for the mechanical handling and storing of coal in large quantities. 20c.

4390 — COAL SUPPLIES — The So-called New Supplies of Anthracite. H. W. Althouse. (Eng. and Min. Journ., Sept. 14, 1907; 3 pp.) Discussion of recent discoveries of anthracite coal deposits, showing that they do not conflict with established geological principles nor point to the existence of coal in unexpected places. 20c.

4391—COKE—Advantages of the By-product Coking Process. E. Bury. (Min. Wld., Sept. 7, 1907, 2 pp.) Discusses the relative merits of gas and coke produced by by-product ovens and ordinary coking furnaces, pointing out the extensive field open to the former. 20c.

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4393—COKE OVEN GAS—Use of By-product Coke-oven Gas. C. E. Rhodes. (Progressive Age, Sept. 2, 1907; 1 p.) Gives particulars as to the actual working results of two batteries of horizontal-flued and vertical-flued ovens. 20c.

4394 — EQUIPMENT — Mechanical Equipment of the Fife Coal Company's Mary Pit at Lochore. (Coll. Guard., Aug. 16, 1907; 1 p.) Description of some of the principal features of the mechanical equipment of this colliery. 20c.

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4396—HAULAGE—Underground Haulage. John Bell. (Journ. Brit. Soc. Min. Students, Aug., 1907; 32 pp.) Very thorough inquiry into the principles which govern the selection of a given system for underground haulage, and detailed consideration of relative merits and defects of various subordinate devices.

4397—HOLLAND—Le Gisement houiller du Limbourg neerlandais et son Exploitation. A. Delmer. (Annales des Mines de Belg., T. XII, 3 livr., 1907; 31 pp.) The first part of this article deals with the deposit proper, and the second part takes up the exploitation and the results so far secured in this coal basin, which is an extension of the Campine deposits in Belgium.

4398—MINE GASES—The Effect of Barometric Variation on the Outflow of Gas in Mines. W. H. Booth. (Eng. and Min. Journ., Aug. 31, 1907; ½ p.) Discusses the effect of barometric variations upon gas emanations. 20c.

4399—MONTANA COAL SITUATION. R. P. Tarr. (Eng. and Min. Journ., Sept. 21, 1907; ½ p.) A brief review of the present status of coal mining in Montana including statements as to the extent of the deposits, character and composition of the coal and the extent of the development warranted by bore hole records. 20c.

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4402—PIT EQUIPMENT—The Silverwood Pit of the Dalton Main Collieries, Limited. (Coll. Guardian, Sept. 13, 1907; 1 p.) Contains descriptions of the shaft equipment of this colliery, the appliances mentioned being the pumps, hoisting engines and hauling outfits. 20c.

4403 — PRODUCTION of Anthracite Coal in 1906. W. W. Ruley. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 9 pp.) Statistical review of the extent of operations during 1906.

4403a—REFUGE CHAMBERS—Unterirdische Rettungs- bezw. Fluchstationen. J.

Mayer. (Oest. Zeit. f. B. u. H., Sept 14, 1907; 2½ pp.) Contains an exposition of the advantage of rescue and refuge chambers for mines and describes some of the chambers now in existence in German mines. These chambers are equipped with compressed oxygen and air pipes. To be continued. 20c.

4404—SHAFT SINKING—Creusement des puits d'Harchies par le Procédé Poetsch. C. Niederau. (Annales des Mines de Belg., T. XII, 3 livr., 1907; 30 pp.) Deals with the sinking of pits by the Poetsch freezing process, to explore the coal concession in the commune of Harchies, so as to determine the best location for the permanent shafts for working the seams.

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4407—VENTILATION—Concrete Overcasts in Coal Mines. John H. Haertter. (Eng. and Min. Journ., Sept. 7, 1907; 4 pp.) Deals with the use of overcasts in ventilating coal mines, and gives detailed figures of cost of constructing concrete overcasts, showing their superiority over wood. 20c.

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COPPER

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4419—QUEENSLAND—Cloncurry Copper Mining District. L. C. Ball. Queensland Gov. Min. Journ., July 15, 1907; 10 pp.) Continuation of article previously mentioned in this Index. 60c.

4420—SECONDARY ENRICHMENT—The Oxidation of Pyrite. A. N. Winchell. (Mines and Min., Sept., 1907; 1 p.) Records the results of experiments to determine the rate of oxidation of pyrite by air charged with water, as a preliminary requisite to the secondary enrichment of copper deposits.

4421—SILICON ALLOY—Ueber das Siliciumkupfer. M. Philips. (Metallurgie, Sept. 8, 1907; 5 pp.) Deals with the properties of silicon-copper alloys and discusses the economical manufacture of silicon for industrial purposes. 40c.

4422—SMELTING in the Boundary Copper Field, B. C. R. Stokes. (Min. Wld., Sept. 21, 1907; 2½ pp.) Gives a general survey of smelting establishments and the processes used in them for smelting the copper ores found in this district. 20c.

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DIAMONDS

4423a—NEW SOUTH WALES, Diamonds in. T. W. E. David. (N. Z. Mines Rec., July 16, 1907; 3½ pp.) Discusses the recent diamond discoveries in this Australian state, and attempts to apply present knowledge concerning the diamond occurrence and their origin in other famous fields, to the derivation of a theory as to the source of the diamonds in this State. 40c.

4424 — ORIGIN OF DIAMONDS. F. W. Voit. (Mines and Mining, Aug. 30, 1907; 1 p.) Paper read before the Geol. Soc. of So. Africa. Considers the effect and importance of various types of rough diamonds in modifying existing theories as to their origin. 20c.

4425—ORIGIN OF DIAMONDS—The Origin and Occurrences of the Diamond. T. W. E. David. (Min. Journ., Aug. 24, 1907; 1 p.) Considers new information bearing upon the origin of diamonds gathered from examination of original matrices, and also from attempts to produce diamonds artificially. 20c.

FELDSPAR

4426—PRODUCTION of Quartz (Flint) and Feldspar in 1906. E. S. Bastin. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 22 pp.) Contains the usual review of progress of mining these two minerals during 1906. 20c.

FLUORSPAR AND CRYOLITE

4427—PRODUCTION of Fluorspar and Cryolite in 1906. E. F. Burchard. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 8 pp.) Gives information upon the character and occurrences of fluorspar and cryolite, separation, uses and market conditions, also statistics of production and imports.

GOLD AND SILVER

4428—ALLUVIAL DEPOSITS—The Occurrence of Alluvials in Hungary and Transylvania, and the Profitableness of Working Them on a Large Scale by Means of Dredges. L. Horvath. (Min. Journ., Sept. 7, 1907; 1 p.) Translation from *Montan-Zeitung*, reviewing present operations and showing that large scale operations by dredges would doubtless be very profitable. 20c.

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4430—COBALT SILVER FIELD, Ontario.—II and III. R. Stokes. (Min. Wld., Aug. 31 and Sept. 14, 1907; 5 pp.) Continuation of article previously indexed, reviewing mining conditions in this field, and giving information upon the capitalization and operation of the principal mining companies. 40c.

4431—COLORADO—Some Gold and Tungsten Deposits of Boulder County, Colorado. W. Lindgren. (Econ. Geology, July-Aug., 1907; 10 pp.) Gives a few preliminary remarks upon the general geology and the mineral deposits of this district and inquires especially into the origin of the tungsten veins. 60c.

4432—CYANIDATION—Last Drainings. H. A. White. (Journ. Chem., Met. and Min. Soc. of South Africa, July, 1907; 1 p.) Reply of author to the discussion of his paper, which was previously mentioned in this Index. 40c.

4433—CYANIDATION — Die Homestake-Schlammanlage und das Merrill-Filter. K. Pietrusky. (Metallurgie, Sept. 8, 1907; 5½ pp.) Describes the appliances, operations and working methods used in the new slime plant of the Homestake mine in South Dakota. 40c.

4434—DREDGING for Gold in New South Wales, Victoria and Queensland. (Queensland Gov. Min. Journ., July 15, 1907; 2½ pp.) Reviews the progress of several recent attempts to dredge for gold in these Australian States. 60c.

4435—HYDRAULIC EQUIPMENT of the Old Channel Mines. John M. Nicol. (Min. and Sci. Press, Sept. 14, 1907; 3 pp.) Gives some details as to the equipment of this group of mines where operations are now conducted on a large scale and where concentrating tables are used in conjunction with sluices. A brief account of the experiments now under way for improving the concentrating process is also included. 20c.

4436—HYDRAULIC MINING in Cariboo. D. Waterman. (Min. and Sci. Press, Sept. 7, 1907; 2½ pp.) A general outline of geological and mining conditions in this British Columbian district with a few brief notes on the two section method of hydraulicking which is in use. 20c.

4437—MEXICO—The Mines of El Doctor. T. D. Murphy. (Min. and Sci. Press, Aug. 24, 1907; 4 pp.) Short historical sketch of mining in this Mexican district, also notes on the present state of mining development. 20c.

4438—NEVADA—The Mohawk Mine. A. Becker. (Am. Min. Rev., Aug. 31, 1907; 1 p.) Deals with the present state of development and the structural geology of this mine, which is one of the more important ones in Goldfield. 20c.

4439—NEW ZEALAND—Notes on Waihi Ore Treatment. R. Stokes. (Journ., Chem., Met. and Min. Soc. South Africa, July, 1907; 4 pp.) Deals with ore grinding practice at this mine, giving information as to the character of lining used in tube mills and the method of fastening it, also with the vacuum filtering of slimes as practiced. 60c.

4440—ONTARIO—The Montreal River Silver District. R. Meeks. (Eng. and Min. Journ., Sept. 21, 1907; 5 pp.) An account of present conditions in this district as seen by the author on a recent visit, giving information as to the cost of freight and supplies, character of the claims and the future possibility of the district. 20c.

4441—ORIGIN OF GOLD in the Rand Banket. J. W. Gregory. (Paper to be read before the Brit. I. M. M., Oct., 1907; 39 pp. Inquires into the genesis of gold in the Rand formation, and considers arguments for and against some of the principal theories that have been brought forward.

4442—PHILIPPINES—Gold Placers of Neuva Ecija. (Far Eastern Rev., Aug., 1907; 1 p.) Notes on the character of the gravel of these Luzon placers and on the working methods and equipment. Traces of platinum have been found in some of the placers of this district. 40c.

4443— PLACER INVESTIGATIONS — The Essential Data of Placer Investigations—II. J. P. Hutchins. (Eng. and Min. Journ., Aug. 31, 1907; 2 pp.) Continuation of article previously mentioned in this Index, giving points to be ascertained and precautions to be taken

in the examination and valuation of placer ground before exploitation. 20c.

4444 — QUEENSLAND — The Premier Goldfield of Queensland. John Plummer. (Min. Wld., Sept. 14, 1907; 1 p.) Brief notes upon the method of mining and the output of the Charters Towers goldfield. 20c.

4445—RAND MINING—The Commercial Aspects of Rand Mining. G. A. Denny. (Min. Journ., Aug. 24, 31 and Sept. 7, 1907; 2½ pp.) Exhaustive inquiry into the exact nature of the so-called profit from the Rand, with an attempt to analyze various factors which enter into the consideration of the question. 60c.

4446—SANTO DOMINGO—Gold Mining in Santo Domingo. F. Lynwood Garrison. (Eng. and Min. Journ., Sept. 14, 1907; 2½ pp.) Gives a brief historical outline of former gold mining operations in this South American country together with some notes on recently discovered deposits of placer gold. 20c.

4447—SLIME—Concentration of Slime. W. E. Darrow. (Min. and Sci. Press, Aug. 31, 1907; 1 p.) Gives some of the author's experiences in the use of canvass tables as a means of recovering values from mill slimes. 20c.

4448—TUBE MILL PRACTICE, Notes on Some Recent Improvements in. K. L. Graham. (Journ. Chem., Met. and Min. Soc. of South Africa, July, 1907; 1½ pp.) Discussion by J. Lea of the above paper which was previously mentioned in this Index. 40c.

4449—UTAH—Ophir, Dry Canyon and Stockton. C. W. Higgins. (S. L. Min. Rev., Sept. 15, 1907; 3½ pp.) A review of geological conditions in these camps with descriptions of the present status of mining operations and the outlook for future developments. 20c.

GYPSUM

4450—GYPSUM and Gypsum Products in 1906. E. F. Burchard. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 13 pp.) Gives the output of gypsum in the United States; also information regarding the extent of gypsum deposits, uses of the prepared product and trade conditions. 20c.

4451—MONTANA GYPSUM DEPOSITS. J. P. Rowe. (Mines and Min., Sept. 1907; 2 pp.) Gives general descriptions of the principal beds of gypsum in Montana, the extent of their development, and the geological character of the formation in which they occur. 20c.

IRON AND STEEL

4452—AGE OF STEEL—Further Experiments on the Ageing of Mild Steel. C. E. Stromeyer. (Iron and Steel Inst., Sept., 1907; advance sheets; 22½ pp., 14 plates). Continues the experiments made along the above line and previously mentioned in this Index, this article giving the results of drop tests on specimens which had been subjected to low temperatures for long periods.

4453—ALABAMA IRON ORE — New Sources of Ore Supply in Alabama. (Manufacturers' Rec., Sept. 12, 1907; ½ p.) Brief review of the results of diamond drill explorations in the Birmingham district. 20c.

4454—ANNEALING High-Speed Steel. E. Viall. (Am. Machinist, Aug. 29, 1907; 1 p.) Compiles directions for the proper annealing and heat treatment of high speed steels from information supplied by several leading manufacturers. 20c.

4455 — AUSTRIAN IRON INDUSTRY During the Last Twenty-Five Years. W. Kestranek. (Iron and Steel Inst., Sept., 1907; advance sheets; 16 pp.) A review of the progress made in the development of the Austrian iron industry and a consideration of the reasons for the relatively slow development in this country.

4456—BLAST FURNACE—VII. H. Allen. (Iron Tr. Rev., Sept. 12, 1907; 2 pp.) Continuation of article previously mentioned in this Index, giving various facts connected with the management of plants which are run on waste gases from gas furnaces; considers also the necessary changes in operations due to the periodical varying of the quality of the gas. 20c.

4457—BLAST FURNACE GAS—The Determination of the Total Quantity of Blast-furnace Gas for a Given Make and Its Calorific Value. J. von Ehrenwerth. (Iron and Steel Inst., Sept. 1907; advance sheets; 2½ pp.) Develops a method of determining the total quantity of blast furnace gas at any given time, the data required by this method being, the weight of carbon contained in the gases corresponding to any particular unit of weight and an analysis of the gas.

4458 — CASE-HARDENING. G. S. Scott. (Iron and Steel Inst., Sept., 1907; advance sheets; 19 pp.) An experimental investigation into the theory and practice of case hardening, describing several mixtures used for this purpose and considering the influence of temperature, time and cementing material upon this process.

4459—CASE-HARDENING of Mild Steel. C. O. Bannister and W. J. Lambert. (Iron and Steel Inst., Sept., 1907; advance sheets; 7½ pp., 4 plates). Gives the author's observations upon the depth of hardness and the carbon content of case-hardened mild steel and illustrates the points brought out by numerous microphotographs.

4460—CHARCOAL FURNACE—Cold Blast Charcoal Furnace in Bald Eagle Valley, Penn. (Iron Tr. Rev., Sept. 12, 1907; 3 pp.) Deals with the equipment of this old iron plant which uses a cold blast charcoal furnace, giving details as to furnace management. 20c.

4461—CHROMIUM ANALYSIS—Ueber die Chrombestimmung im Stahl, insbesondere bei Anwesenheit von Wolfram. G. v. Knorre. (Stahl u. Eisen, Aug. 28, 1907; 4 pp.) Gives several procedures for the volumetric determination of chromium in steels, with a discussion of the modification necessary in the process when tungsten is also present. 40c.

4462 — COMPRESSED AIR — Anwendung der Pressluft im Giessereibetriebe. W. Häntschel. (Eisen-Zeit., Sept. 14, 1907; 1½ pp.) A descriptive account of the application of compressed air in German foundry practice, this instalment dealing in general with the types of compressors used. 20c.

4463—CORROSION of Iron and Steel. W. H. Walker, A. M. Cedarholm and L. N. Bent. (Journ. Am. Chem. Soc., Sept., 1907; 14 pp.) Gives the preliminary work done in an attempt to determine whether wrought iron is more subject to corrosion than steel and investigates the factors which cause corrosion and the conditions under which it proceeds. 60c.

4464 — CRUCIBLE STEEL — Einiges über Tempergiessereien. W. Müller. (Stahl u. Eisen, Aug. 28, 1907; 4½ pp.) Contains information relating to the operation of a foundry making temper steel castings, and using crucible furnaces in place of cupolas. 20c.

4465—CUPOLA PRACTICE—Comparative Cupola Practice. W. S. McQuillan. (Trans. Am. Fdymen's Assn., May, 1907; 3¼ pp.) Tabulation of answers from many foundries to a list of questions relating to the use of fuel, cupola efficiency and foundry practice in general.

4465a—CUYUNA RANGE—Development of the Cuyuna Range . (Iron Tr. Rev., Sept. 26, 1907; 1 p.) Enumerates some of the leading concerns that are interested in this range and comments upon the exploration work which each has done. It appears that the present high transportation charges on the ore will work against any extensive exploitation for some time to come. 20c.

4466—ELECTRIC FURNACE—The Induction Furnace for the Production of Steel by Electricity. (Trans. Am. Fdymen's Assn., May, 1907; 4 pp.) Deals with the principle of construction and operation of this type of furnace, and compares it with other electrical smelting methods.

4467—ELECTRIC SMELTING—Die Erzeugung von Roheisen im elektrischen Ofen. (Stahl u. Eisen, Aug. 28, 1907; 7 pp.) An extended description of several types of electric furnaces for the production of pig iron, and of the methods of running the furnaces, and their special features of construction. 40c.

4468 — ELECTRIC SMELTING — The Electrothermic Reduction of Iron Ores. A. E. Greene and F. S. MacGregor. (Electrochem. and Met. Ind., Sept., 1907; 4 pp.) Gives the results of an experimental investigation on the possibility of reducing iron ore by electricity, with very complete details on the design of the furnace, the character of the charges used, and the product obtained. 40c.

4469—FERRO-ALLOYS for Foundry Use. E. Houghton. (Foundry, Sept., 1907; 3½ pp.) Paper presented before the Brit. Fdymen's Assn., describing the methods of production of ferro-alloys and also the treatment of iron to secure definite chemical and physical properties. 20c.

4470—GOGEBIC RANGE—Progress on the Gogebic Range. (Iron Tr. Rev., Sept. 19, 1907; 2 pp.) Reviews recent developments on this range and gives details of new equipment which has been installed and development which has been done. 20c.

4471—HARDENED STEELS — Percy Longmuir. (Iron and Steel Inst., Sept., 1907; advance sheets; 7½ pp., 6 plates). Gives brief information upon present practice in hardening steels and describes the structure of steels which have been hardened by commercial methods.

4472—HARDENING of Steel. L. Demozay. (Iron and Steel Inst., Sept., 1907; advance sheets; 35½ pp. 1 plate). Investigates the importance of the temperature of heating, its duration, the energy of the quenching bath and the size of the pieces quenched upon the hardening of steel.

4473—HUNGARY—Blast Furnaces at Vajda-Hunyad. (Engineer, Lond., Sept. 6, 1907; 1 p.) Contains a brief general account of iron mining and smelting at the Gwalar iron mines in Hungary. 40c.

4474—IRON RESOURCES OF THE SOUTH. E. C. Eckel. (Manufacturers' Rec., Sept. 19, 1907; 1 p.) Reviews the extensive resources of the South in the matter of iron ores, and calls attention to the ease in which fluxes, ores and fuels may be assembled and the cheapness of mining operations. 20c.

4475 — JAPANESE GOVERNMENT STEEL WORKS—(Far Eastern Rev., Aug. 1907; 1½ pp.) Gives information as to the equipment and general features of the imperial steel works of Japan which are situated near the port of Wakamatsu and which have a capacity of 300 tons of bessemer steel per 24 hours. 40c.

4476—LIFTING MAGNETS—A New Line of Lifting Magnets. (Iron Tr. Rev., Sept. 12, 1907; 2½ pp.) Gives general information upon the use of magnets for lifting pig iron and steel billets, also some of the data secured during the tests of one of these large magnets. 20c.

4477—METALLURGY OF IRON, Application of the Laws of Physical Chemistry in the. H. von Jüptner. (Iron and Steel Inst., Sept., 1907; 28 pp.) Reviews some fundamental principles of physical chemistry and points out their application to iron blast furnace management.

4478—MEXICO—The Iron Deposit of Cerro de Mercado, Durango, Mexico. E. Halse. (Min. Journ., Sept. 7, 1907; 1½ pp.) Gives an historical sketch of this iron ore deposit with brief information as to its extent and character. 20c.

4479—NICKEL STEEL—Die Verarbeitung von nickelhaltigem Magnetkies im elektrischen Ofen zur Herstellung von Säure and Ferronickel. E. A. Sjöstedt. (Glückauf, Aug. 17, 1907; 4 pp.) A detailed description of the apparatus and the operations used in the manufacture of acid and ferro-nickel, by substituting nickeliferous pyrrhotite for pyrite. This process has recently been devised and perfected by the metallurgists of the Lake Superior Corporation at Sault Ste. Marie, Ont. 40c.

4480—NORMANDY—Situation de l'Industrie minérale dans le Departement du Nord au Ler Juillet 1907. M. Mettrier, (L'Echo des Mines, Sept. 16, 1907; 1½ pp.) Brief note on the present status of iron mining in Normandy. 20c.

4481—POWER DISTRIBUTION—The Economic Distribution of Electric Power from Blast Furnaces. B. H. Thwaite. (Iron and Steel Inst., Sept., 1907; advance sheets; 11½ pp.) A consideration of the possibilities and advantages of pooling the waste power from the blast furnaces of a district in order to generate electric energy at a central station for subsequent distribution to the contributing plants.

4482—PROTECTIVE PAINT— A New Blue-black Iron Paint as a Protective Covering. F. J. R. Carulla. (Iron and Steel Inst., Sept., 1907; advance sheets; 2 pp.) Description of a process of obtaining a paint suitable for protecting structural steel as a by-product from the pickling bath of galvanizing and wire drawing plants.

4482a—ROLLING MILL of the Pacific Coast. H. C. Estep. (Iron Tr. Rev., Sept. 26, 1907; 4 pp.) Gives an interesting account of the difficulties in establishing the first Pacific Coast rolling mill and placing

it on a paying basis. Describes also its present equipment, working methods and its industrial importance. 20c.

4483—SEAL FOR CUPOLAS—Apparate zum Niederschlagen der Gichtflamme und Funken an Kupolöfen. (Eisen-Zeit., Aug. 31, 1907; 1 p.) Brief description of apparatus attachable to cupola furnaces and adapted to prevent the escape of burning gases and cinders upon charging. 20c.

4484—SPECIAL STEELS—The Forging of Alloy Steels. E. F. Lake. (Am. Machinist, Aug. 29, 1907; 2 pp.) Shows the effect of temperature, methods of forging, welding and annealing on the production of high grade alloy steels. 20c.

4485—STEEL AND METEORIC IRON. Frederick Berwerth. (Iron and Steel Inst., Sept., 1907; advance sheets; 10 pp.) Points out some of the resemblances between meteoric iron and steel.

4485a—STEEL PLANT—The Bethlehem Steel Company's New Plant. (Iron Age, Sept. 26, 1907; 8 pp.) Description of the equipment of this new and modern steel plant and its operation, giving most attention to the rail and structural mills, the open hearth plant which is very well designed, and the blooming mill. 20c.

4486—STEEL WORKS—Amerikanische Eisenbauwerkstätten. R. Dietze. (Stahl u. Eisen, Sept. 4, 1907; 6 pp.) Extracts from and a review of a book of the same title, giving much information as to the organization and scope of operations of the principal American steel constructing firms. 40c.

4487—SWEDEN—Description of the Mine Fields at Grängesberg. Nils Hedberg. (Jern kontorets Annaler, 1907, 58 pp.)

4488—TEMPERING—Der Glüh- und Härteofen mit elektrisch geheiztem Schmelzbad. L. M. Cohn. (Elektrotechnik u. Maschinenbau, Aug. 18 and 25, 1907; 8 pp.) An extensive outline of progress in the art of heating tempering baths and furnaces by electricity and a summary of present conditions. The articles have several illustrations and tables of tempering temperatures. 40c.

4489—TYROL REGION—The Erzberg of Eisenerz. H. Bauerman. (Iron and Steel Inst., Sept., 1907; advance sheets; 12 pp., 3 plates). Short description of the geological, chemical and mineralogical features of these iron ore deposits which are located on the north slope of the Eastern Alpine range.

4489a—VANADIUM STEEL—The Effect of Vanadium in Steel. E. T. Chlarage. (Iron Tr. Rev., Sept. 26, 1907; 1½ pp.) Considers the effects which vanadium has upon steels, especially in its ability to eliminate nitrogen which appears to be the cause of poor quality in some irons and steels, and the absence of which is the real reason for the superiority of Swedish iron. 20c.

4490 — VANADIUM STEELS — Types and Tests of Vanadium Steels. (Iron Tr. Rev., Aug. 29, 1907; 3 pp.) Gives the results of tests on vanadium steel of different types. 20c.

4491 — WASHINGTON — The Irondale Furnace Near Seattle, Wash. H. Cole Estep. (Iron Tr. Rev., Sept. 19, 1907; 4 pp.) The history of the attempts to operate this iron smelter on the Pacific Coast is given, also a description of the present state of operations. 20c.

4492—WATER STORAGE—A Colorado Mountain Reservoir. R. M. Hosea. (Journ. Western Soc. Eng., Aug., 1907; 18½ pp.) An account of the location, design and construction of the Sugar Loaf reservoir which was built by the Colorado Fuel and Iron Company near Leadville in order to obtain a reliable source of water supply for its Federal plant. 40c.

LEAD

4493—ROASTING OF GALENA—Contribution a l'Etude du Grillage de la Galène en vue l'Obtention d'un nouveau blanc de Plomb. (Rev. de Chim. Ind., Aug. 15, 1907; 6½ pp.) An extended inquiry into the roasting of galena and the process of making white lead; examines analytically all the secondary products obtained and studies their physical and chemical properties. 40c.

MICA

4494—PRODUCTION of Mica in 1906. D. B. Sterrett. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 19 pp.) Reviews the progress of the mica industry during 1906, including statistics of production and market conditions.

NICKEL

4495—NICKEL PLATE IMPURITIES—A Study of the Causes of Impure Nickel Plate with Special Reference to the Iron. D. F. Chalhane and A. L. Gammage. (Journ. Am. Chem. Soc., Sept., 1907; 5½ pp.) Describes the chemical work done and the results obtained while studying the conditions which influence the deposition of injurious iron on nickel plate. 60c.

PETROLEUM

4496—CALIFORNIA—The Santa Maria Oil Fields. L. E. Blochman. (Pac. Min. and Oil Rep., Aug. 20, 1907; 1 p.) Brief summary of present conditions in this California field, with a few notes on the extent of operations of some of the chief producers. 20c.

4497—DISTRIBUTION OF PETROLEUM—The Effect of Geological Structure upon the Distribution of Petroleum. A. B. Thompson. (Petrol. Rev., Sept. 14, 1907; 2½ pp.) Paper read before the Third International Petroleum Congress. Cites a number of cases which have been met with in European oil fields showing how irregularities and contortions of strata have an important bearing upon the distribution of petroleum pools. 40c.

4498—MEXICO—Oil in the State of Vera Cruz. E. Ordonez. (Min. and Sci. Press, Aug. 24, 1907; 1½ pp.) Deals mostly with the geological conditions in the oil fields of this Mexican state. 20c.

PHOSPHATE ROCK

4499—ALGERIA AND TUNIS—Die Phosphatlagerstätten von Algier und Tunis. O. Tietze. (Zeit. f. prak. Geol., Aug., 1907; 22 pp.) An exhaustive study into the nature and extent of the phosphate rock resources of Algeria and Tunis, dealing especially with geological aspects, but giving brief information as to the extent of mining. 40c.

4500—PRODUCTION of Phosphate Rock and Phosphorus in 1906. M. L. Fuller and G. W. Stose. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 16 pp.) Reviews the production of phosphate rock by States, and deals at some length with the manufacture, refining and uses of phosphorus.

PRECIOUS STONES

4501 — PRODUCTION of Precious Stones in 1906. D. B. Sterrett. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 44 pp.) Reviews the present status of the precious stone and gem mining industry in the United States including statistics of production and value, and notes on new discoveries. 20c.

4502—TURQUOISE in the Burro Mountains, New Mexico. E. R. Zalinski. (Econ. Geology, July-Aug., 1907; 29 pp.) Deals with the general geology of the region, geology of the turquoise deposits proper, composition of the turquoise, its genesis and the treatment of the material. 60c.

QUICKSILVER

4503—CONSTITUTION OF AMALGAMS—Die Diffusion von Metallen in Quecksilber. M. von Wogau. (Zeit. f. Elektrochem., Aug. 16, 1907; 2 pp.) An experimental inquiry into the physical and chemical aspects of the formation of amalgams and of solutions of metals in quicksilver. 40c.

RARE METALS

4504—MONAZITE AND ZIRCON, The Production of, in 1906. D. B. Sterrett. (Advance Chapter from Mineral Resources of the U. S., Calendar Year, 1906; 19 pp.) Notes on the location and occurrence of deposits, their geology, methods of mining and cleaning, and review of the industry in foreign countries.

4505—RUTILE—Occurrences of Rutile in Virginia. T. L. Watson. (Econ. Geology, July-Aug., 1907; 11 pp.) Gives the result of field and laboratory study into the mineralogical character of the rutile-bearing and associated rocks in Virginia. 60c.

SAND

4506—GLASS SAND—The Production of Glass Sand, Sand and Gravel in 1906. Prepared under the directions of E. F. Burchard. (Advance Chapter from Mineral Resources of the U. S., 1906; 11 pp.) Sums up the developments during the year 1906 in regard to the glass and molding sand industries, with statistics of production and importation and a review of market conditions. 20c.

STONE

4507—GRANITE QUARRYING in Aberdeenshire, Scotland. Wm. Simpson. (Eng. and Min. Journ., Aug. 31, 1907; 2 pp.) Abstract of paper read before the Brit. Instn. Mechan. Eng., July, 1907, describing a method used in this quarry of excavating, drilling, blasting and handling of product. 20c.

TALC AND SOAPSTONE

4507a—PRODUCTION of Talc and Soapstone in 1906. A. J. Collier. (Advance chapter from Mineral Resources of the U. S., Calendar year 1906; 7 pp.) Contains the usual review of the occurrences of talc and its production during 1906, but consists principally of statistics as to output, and imports, both of the United States and of Canada.

TIN

4508—METALLIC ALLOYS—Tellurium-Tin Alloys. H. Fay. (Journ. Am. Chem. Soc., Sept., 1907; 3 pp.) Describes the preparation of the metallic tellurium used in this investigation which determines the melting points and properties of a series of these alloys. 60c.

TUNGSTEN

4509 — COLORADO — Some Gold and Tungsten Deposits of Boulder County, Colorado. W. Lindgren. (Econ. Geology, July-Aug., 1907; 10 pp.) See comment under "Gold and Silver".

ZINC

4510—ELECTROLYTIC DEPOSITION OF ZINC, Using Rotating Electrodes. H. T. S. Price. (Trans. Faraday Soc., July, 1907; 9 pp.) Gives an account of the results obtained by the author in a thorough test of various proposed methods for the deposition of zinc.

4511—GRANBY, MISSOURI — Mining and Smelting at Granby, Missouri. Edwin T. Perkins. (Eng. and Min. Journ., Aug. 31, 1907; 2 pp.) Treats of the geology and ores of the Granby zinc-lead district, and gives information as to methods of ore production, mine development and smelting. 20c.

4512—LABORATORY of the Coffeyville Zinc Works. E. W. Buskett. (Eng. and Min. Journ., Sept. 21, 1907; 2 pp.) Gives detailed drawings and descriptions of the above laboratory which the author designed, showing the general arrangement, the construction of laboratory and balance tables and the assay furnaces. 20c.

4513—ORE GENESIS—Differentiation by Leaching in the Wisconsin Zinc Region. H. A. Wheeler. (L. & Z. News, Aug. 26, 1907; 1½ pp.) A few brief notes on the character of the Wisconsin zinc district and the probable action of oxidizing and leaching agencies which resulted in separating the zinc from the lead. 20c.

4514—ZINC-LEAD PIGMENT PLANT of U. S. Smelting Company, Canon City, Colo. P. Barker. (Min. Reporter, Sept. 5, 1907; ½ p.) Short general note on the process of manufacturing and refining zinc-lead pigment as practiced by this company. 20c.

ECONOMIC GEOLOGY—GENERAL

4515—NEW CALEDONIA and Its Minerals. G. M. Colvocoresses. (Eng. and Min. Journ., Sept. 21, 1907; 3 pp.) Some interesting notes upon the geography, geology and mineral resources of this Pacific island giving special attention to the serpentine rocks and their accompanying deposits of nickel, cobalt and chrome ores. 20c.

4516—SANTO DOMINGO—Metallic Sulphides in the Tuffs of Santo Domingo. F. Lynwood Garrison. (Min. and Sci. Press, Sept. 7, 1907; 5 pp.) Contains the results of an extended inquiry into the geological characteristics of the deposits of

tuffs in this country, also their mineralogical features,, and discusses the information ascertained in relation to the origin of ore deposits. 20c.

4517—TASMANIA—Report on the Bell Mount and Middlesex District. W. H. Twelvetrees. (Gov. Geologists' Office, June 17, 1907; 29 pp.) Gives a report on the geological conditions of this field, and describes the mineral occurrences and the operations which have been undertaken by a few of the mining companies.

4518—WYOMING—Geologic Atlas of the United States, Devils Tower Folio, Wyoming. (U. S. Geol. Surv., 1907; 14 pp.) Contains topographic, areal geology and artesian water maps, together with descriptive text relating to the geography and geology of the district.

MINING—GENERAL

4519—BRITISH COLUMBIA—Metalliferous Mining on West Coast of Vancouver Island. (Brit. Col. Min. Rec., July, 1907; 15½ pp.) Gives notes on the status of mining metalliferous veins in the different producing districts, with brief outlines of the extent of operations in the case of important mines. 20c.

4520—CAVING SYSTEM at the Darien Mine. A. B. Chase. (Min. and Sci. Press, Aug. 24, 1907; ½ p.) An account of the application of the caving system at this mine where it superseded mining by square-sets. 20c.

4521—EARTH PRESSURE—The Bracing of Trenches and Tunnels, with Practical Formulas for Earth Pressures. J. C. Meem. (Proc. A. S. C. E., Aug., 1907; 26 pp.) Enters into the subject of earth pressure in trenches, tunnels and excavations, and the best systems of timbering best adapted to resist them.

4522—EDUCATION—The National Engineering School of Mexico. M. Merriman. (Eng. News, Sept. 19, 1907; 2½ pp.) A brief review of the history of this old institution which has recently been developed into a national school of engineering. The present organization of the school, its equipment and arrangement are fully described. 20c.

4523 — ELECTRICAL ORE FINDING By Daft and Williams Method. Walfr. Petersson. (Jern kontorets Annaler, 1907; 18 pp.) Describes the method developed by the Electrical Ore Finding Co., London, and some successful experiments with it at mines in Sweden.

4524 — EXPLOSIVES — Les Explosifs Modernes. H. Schmerber. (Genie Civ., Aug. 31, Sept. 7 and 14, 1907; 6 pp.) Treats of the theoretical aspects of explosives, and their actions, and studies the present methods of testing their power. Also deals with the basic differences between the various standard explosives. To be continued. 80c.

4525—EXPLOSIVES—Ueber die Prüfung von Sicherheitsprengstoffen. Beyling. (Glückauf, Sept. 7, 1907; 8 pp.) A very thorough article on the testing of safety explosives adapted for use in gaseous and dusty mines. The systematic methods of carrying out these tests are described and specific information as to some results secured are given. 40c.

4526—HOISTING—Die Lastenförderung im Bergbau und im Huttenwerk. (Oest. Zeit. f. B. u. H., Sept. 7 and 14, 1907; 7½ pp.) An historical outline of the development of heavy hoisting in mining and metallurgy. 60c.

4527—MEXICO—The Mines of Ojuela. (Am. Min. Rev., Sept. 14, 1907; 1½ pp.) Deals with the development and equipment of this large lead-silver mine near Matani in Durango, and describes briefly some of the engineering difficulties which had to be overcome. 20c.

4528—MEXICO—The West Coast of Mexico. Dwight E. Woodbridge. (Eng. and Min. Journ., Aug. 31, 1907; 2 pp.) Notes gathered by the author while making a trip through this region, describing the resources of the country, transportation, business methods and labor conditions. 20c.

4529—MINE MULES—The Care of Mine Mules. I. C. Newhard. (Mines and Min., Sept., 1907; 2½ pp.) Abstract of a lecture to the foremen of the Reading Coal and Iron Co., dealing with feed, harnessing, shoeing and care of hoofs and the comparative advantages of stables above and below ground. 20c.

4530—MINE SUBSIDENCE. A. Richardson. (Journ. Chem., Met. and Min. Soc. of South Africa, July, 1907; 1½ pp.) Discussion by members of the Society of the above paper, which was previously mentioned in this Index. 40c.

4531—MINE SUPPLIES—Keeping Account of Supplies.—I. and II. M. W. Alderson. (Min. and Sci. Press, Aug. 31 and Sept. 14, 1907; 1½ pp.) Points out briefly systematic methods whereby the keeping of supply accounts may be simplified, with resultant lowering of operating costs. 40c.

4532—MINERAL AND METAL PRODUCTION of the United States. (Reprint from THE MINERAL INDUSTRY, Vol. XV, 1907; 10 pp.) Statistics and summary of the production of ores, minerals, metals and chemical products in the United States during 1906. 20c.

4532a—MINING CUSTOMS—Old Methods in Mexico. (Min. and Sci. Press, Sept. 21, 1907; 2 pp.) An interesting account of old mining methods in Guanajuato as they existed 40 years ago, describing the systems of leasing, apportioning ore to leasers, paying wages, disposal and sale of ore, etc. 20c.

4533—MINING LAW—State Provisions for Location of Lode Claims. R. S. Morrison. (Ores and Metals, Sept. 5, 1907; 1½ pp.) Outlines the steps which must be taken by the prospector in order to secure title to mining claims in Nevada. 20c.

4534—NEW MEXICO—The Lordsburg Mining Region, New Mexico. Fayette A. Jones. (Eng. and Min. Journ., Sept. 7, 1907; 2 pp.) Notes on the history of mining in this region, and general information as to the geology of the country and the character of the ores. 20c.

4535—NEW ZEALAND—The Mining Industry of New Zealand. P. E. Cheal. (N. Z. Mines Rec., June 17, 1907; 7½ pp.) A review of the mineral resources of this country, with special attention to possibilites of utilizing hydro-electric power. 40c.

4536—PERU—Estadistica Minera del Peru en 1906. G. Klinge. (Bol. del. Cuerpo de Ingenieros de Minas del Peru, No. 54, 1907; 39 pp.) A review of the condition of the mineral industry in Peru, giving statistics of production of metals, minerals and salts, and brief information as to some of the chief smelting establishments.

4537—PERU—Recursos Minerales de la Provincia de Huamachuco. F. M. Santolalla. (Bol. del Cuerpo de Ingenieros de Minas del Peru, No. 51, 1907; 66 pp.) A detailed review of the geology and mineral resources of this province, together with descriptions of the mining and metallurgical methods.

4538—SHAFT BORING—Der hydraulische Schachtbohrer. Schlüter. (Glückauf, Sept. 7, 1907; 12 pp.) A valuable article dealing at length with the design, construction, operation and performance of the improved form of hydraulic shaft borer, which bores its shafts by benches. The device is the result of many improvements made during working operations. 40c.

4539—SHAFT CONNECTION—A New Method of Shaft Connection. Henry Briggs. (Eng. and Min. Journ., Sept. 14, 1907; 1½ pp.) Description of a new method of shaft connection wherein the use of three wires during shaft plumbing makes it possible to detect and correct any deviations of the wires of a vertical position caused by air currents. 20c.

4539a—STRIKES—The Common Law on Strikes. (Iron Age, Sept. 26, 1907; 1½ pp.) Gives a summary of recent court decisions in regard to such features of strikes as picketing, boycotts, black lists, injunctions, etc. 20c.

4540—TASMANIA—Report of the Secretary for Mines for Year Ending December 31, 1905. (Hobart, Tasmania, 1906; John Vail, Govt. Printer; 66 pp.) Gives usual information as to the progress of the mining industry, and contains several geological reports upon new districts.

4541—TIMBERING in Mines. Oliver H. Denning. (Sci. and Art of Min., Sept. 7, 1907; 2 pp.) A critical comment upon some aspects of mine timbering in England as brought out by the Inspectors of Mines Reports, dealing chiefly with the withdrawal and replacing of timbers. 20c.

4541a—TIMBERING—Square-set Mining and a Modification of It. C. T. Rice. (Min.and Sci. Press, Sept. 21, 1907; 2½ pp.) This article first gives a review of square set systems of mining as used in several camps and then discusses the tendency of stopes and levels to cave into forms which are in substantial equilibrium. The author claims that this natural dome of equilibrium can be utilized in a modified system of square set timbering which he describes. 20c.

4542—TIMBERING MINES in the Joplin District, Missouri. Doss Brittain. (Ores and Metals, Sept. 5, 1907; 2½ pp.) Describes and illustrates the systems of timbering used in the zinc mines of the Joplin district, and the conditions which determine the choice of any particular method. 20c.

4543—UTAH—Alta, Utah: Its Past, Present and Future. C. W. Higgins. (S. L. Min. Rev., Aug. 30, 1907; 3½ pp.) Summary of past and present operations in this camp, including descriptions of some of the chief mining companies. 20c.

4543a—WASTE DISPOSAL—Dumping Residue at Kalgoorlie. M. W. Von Bernewitz. (Min. and Sci. Press, Sept. 21, 1907; 2 pp.) Describes some of the methods of handling waste in this Australian camp where the residue disposal is a serious problem, complicated in some instances by the fact that the waste is rich enough in gold to be worth re-treatment which makes it advisable to keep the waste near at hand. A table of dumping costs of each mine and the systems of disposal used is included. 20c.

ORE DRESSING

4544—FLOTATION PROCESS — Ueber den "Flotation Prozess". C. Göpner. (Metallurgie, Aug. 22, 1907; 5½ pp.) Conclusion of article previously mentioned in this Index. 40c.

4545—GERMAN MILL PRACTICE—Die neue Erzaufbereitungs - anstalt der Grube Berzelius bei Bensberg. C. Blömeke. (Metallurgie, Aug. 22, 1907; 10 pp.) Illustrated description of the equipment and working processes in the recently erected mill of the Berzelius mine at Bensberg. Several cuts and a place showing elevations of the plant are included. 40c.

4546 — MILLING PRACTICE — Some Practical Points of Interest to Millmen. Al. H. Martin. (Ores and Metals, Sept. 20, 1907; 1 p.) Gives brief hints upon the precautions which should be taken to avoid loss in tailings and points out the advantages of keeping continuous records of the work. 20c.

4547—PULP FLOW—Flow of Water Carrying Sand in Suspension. F. K. Blue. (Eng. and Min. Journ., Sept. 21, 1907; 3½ pp.) A detailed account of an experimental investigation to determine the conditions of grade and velocity necessary to keep sand in suspension in water during its flow in launders. A table of the factors obtained for beach sand and slime are given. 20c.

4548—RIFFLES—The Question of Riffles. (Eng. and Min. Journ., Sept. 7, 1907; 1 p.) Describes the working of a pneumatic concentrating table, in which the disadvantage of projecting riffles is done away with and in which air takes the place of water as the sorting agent. Several tests on different ore mixtures are included. 20c.

METALLURGY—GENERAL

4549—ALLOY PRACTICE. G. H. Clamer. (Chem. Engr., Aug., 1907; 3 pp.) Outlines the history and development of the alloy practice in the United States as applied to railway bearings. Paper read at the June, 1907, meeting of the Am. Soc. for Testing Materials. 40c.

4550—ALLOYS—Preparation of Alloys. A. H. Sexton. (Mechan. Engr., Sept. 14, 1907; 3 pp.) Gives practical information as to the best methods of making various alloys, describing the precautions to be taken in each instance. 40c.

4551—FURNACE CHARGES—Calculation of Furnace Charges. R. Chauvenet. (Min. Reporter, Aug. 29, Sept. 5 and 19, 1907; 6½ pp.) Continuation of article previously mentioned in this Index. 60c.

4552 — METALLIFEROUS WASTE — The Systematic Treatment of Metalliferous Waste. L. Parry. (Min. Journ., Aug. 24 and Sept. 7, 1907; 2 pp.) Continuation of lengthy serial, dealing with the general metallugical treatment of alloys of tin, lead and antimony with copper. 60c.

4552a—MEXICO—The Smelter at Mapimi. (Am. Min. Rev., Sept. 21, 1907; 1 p.) The smelter described, is located in Durango about 25 miles west of Bermajillo. The plant is very modern in every respect and is well equipped. The general arrangement of the works and the smelting operations are described briefly. To be continued. 20c.

4553—PYROMETRY—Ueber eine neue Drahtmethode zur Schmelzpunktsbestimmung von Metallen und zur Eichung von Thermoelementen. R. Loebe. (Zeit. f. Elektrochem., Aug. 30, 1907; 1½ pp.) Description of apparatus and method of manipulation used in a new method of determining melting points of metals, whereby electrically operated mechanism records the instant of fusion and the reading of the galvanometer attached to the pyrometer. 40c.

4554—SILICA BRICK PLANT of the Robinson Clay Product Co., Akron, Ohio. (Iron Tr. Rev., Aug. 29, 1907; 3½ pp.) A description of the plant and of the different operations required in manufacturing silica brick for lining open-hearth and similar furnaces. 20c.

4555—UTAH—Lead and Copper Smelting at Salt Lake—I. W. R. Ingalls. (Eng. and Min. Journ., Sept. 21, 1907; 4½ pp.) Describes the character and sources of the ore supply for the Salt Lake smelters, reviews the present situation as regards the smoke question and describes the copper and lead smelteries and the lead blast furnaces of the United States Smelting Company. 20c.

4556—WATER JACKET REPAIRS—Patching Cast Iron Water Jackets. G. C. Klug. (Monthly Journ. Chamber of Mines, W. Australia, July, 1907; 2 pp.) Illustrated description of a method adapted to repair cast iron water jackets wherein the fraction section was cut out and replaced with ¼-in. mild steel plate. 80c.

4557—WELDING—Autogenous Welding. F. C. Cutler. (Cassier's Mag., Sept., 1907; 7 pp.) Gives information as to details of this process,, and a few figures of operating costs. 40c.

4558—WELDING—The Oxy-Acetylene Blowpipe. Cecil Lightfoot. (Iron Age, Sept. 19, 1907; 1 p.) Paper read before the International Acetylene Association. Describes types of blowpipe apparatus in use for this process of welding, giving the gas consumption of each type, also a list of the applications wherein these blowpipes are useful. 20c.

MINING AND METALLURGICAL MACHINERY

4559—AIR COMPRESSORS— A New Development in Air Compressors. F. A. Halsey. (Eng. and Min. Journ., Aug. 31, 1907; 3½ pp.) Detailed description of the principle and the distinctive mechanical features of this machine which is designed for the automatic variation of the air delivered in order to meet a fluctuating demand. 20c.

4559a—CABLEWAYS Used on Shipbuilding Berths. J. M. Henderson. (Instn. Mech. Engrs., July, 1907; 9 pp., 5 plates.) A note on the use of cableways for lifting and conveying weights in shipyards. Particulars as to the equipment of this cableway are given, also drawings of the trolley and its related mechanism.

4560—CENTRIFUGAL FANS—High-pressure Centrifugal Fans. A. Rateau. (Engineering, Aug. 23, 1907; 1 p.) Conclusion of article previously mentioned in this Index comparing the efficiencies of centrifugal turbo-compressors and reciprocating compressors. 40c.

4561—DUST PREVENTION—Improved Methods of Dust Prevention in the Grinding Trades. Samuel R. Bennett, (Iron and Coal Tr. Rev., Sept. 6, 1907; 1 p.) Descriptions of several appliances adapted to the prevention and removal of dust during grinding. 40c.

4562—ELECTRIC POWER—Possibilities of Electricity in Metal Mining. G. M. Dyott. (Elec. Wld., Sept. 7, 1907; 3½ pp.) General review of the present status of electrically operated machines in metalliferous mining. 20c.

4563—GAS ENGINE DEVELOPMENT in Europe and America. (Journ. Elec., Power and Gas, Sept. 7. 1907; 3½ pp.) A general review of improvements in the design of gas engine plants as exemplified by European and American practice. 20c.

4564—GAS ENGINE PRACTICE—Versuche an der Gasmaschine über den Einfluss des Mischungsverhältnisses. A. Nägel. (Zeits. des Vereines deutscher Ingenieure, Sept. 7 and 14, 1907; 16½ pp.) Investigates very thoroughly the effect of varying the proportions of the gas and air mixture upon the performance of gas engines. 80c.

4565—GAS ENGINES. J. Christie and R. H. Fernald. (Proc. A. S. C. E., Aug., 1907; 10½ pp.) Informal discussion by these authors upon the subject of the economical cleaning of producer and furnace gas, and the practical results obtained by various methods for removing tar and soot.

4566—GAS POWER PLANTS, Mains and Fittings for. L. L. Brewer. (Power, Sept., 1907; 1½ pp.) Discusses essential features which must be considered in designing mains and valves for gas power plants. 20c.

4567—HYDRAULIC POWER—Hydraulic Formulae: Development and Discussion. A. Black.. (Sch. Mines Quar., July, 1907; 23 pp.) Develops a general equation for the discharge of water through orifices and over weirs and develops several special cases from this general formula. 60c.

4568—LIQUID FUEL and Its Application in the Foundry. G. B. Waterhouse. (Metal Industry, Sept., 1907; 1½ pp.) Gives particulars as to the construction and operation of several different types of melting furnaces adapted to use in foundries and heated by liquid fuels. 20c.

4569—MINING LOCOMOTIVES—Unique European Electric Mining Locomotives. F. C. Perkins. (Min. Wld., Sept. 7, 1907; 3 pp.) Deals with various types of locomotives of this character which are now in use in Europe, describing at length the specially noteworthy features of each. 20c.

4570 — OIL-ENGINE Driven Power Plant of the Pittsfield Electric Company. (Elec. Wld., Sept. 7, 1907; 1½ pp.) General description of the equipment and operations of the above power plant. 20c.

4571—PIPE—Reinforced Concrete Pipe for Carrying Water Under Pressure. C. W. Smith. (Proc. Am. S. C. E., Aug., 1907; 19 pp.) Describes the construction of a long line of reinforced concrete pipe designed to carry water under pressure; gives the results obtained, and a few figures as to cost.

4572—PIPE DESIGN—A Solution of the Problem of Determining the Economic Size of Pipe for High-pressure Water-power Installation. (Proc. A. S. C. E., Aug., 1907; 15 pp.) Discussion by various members of the Society of the paper by A. L. Adams on this subject, which was previously mentioned in this Index.

4572a — PNEUMATIC TOOLS — Portable Pneumatic Tools. H. Bing. (Instn. Mechan. Engrs., July, 1907; 44 pp.) A review of the progress which has been made in late years in portable pneumatic tools, dealing with improvements in old types of tools, new tools, the principal uses to which the tools are put and the effect of their use on cost of the work on which they are used.

4573—POWER—The Comparative Cost of Steam and Hydro-electric Power. W. O. Webber. (Eng. Mag., Sept., 1907; 4½ pp.) Gives comparative figures as to the operating costs of plants operated by steam and hydro-electric power, taken from the records of plants which came under the author's observation. 40c.

4574—POWER PLANT—The Fremont Power Company Development. C. M. Hyskell. (Elec. Rev., Aug. 31, 1907; 1½ pp.) Describes the equipment of this power development company which is to furnish electric energy to a new smelter in the Sumpter district of Oregon. 20c.

4575—POWER PLANT—The Hydro-electric Development of the Great Northern Power Co.—I and II. (Eng. Rec., Sept. 7 and 14, 1907; 8½ pp.) Describes the preliminary construction work for this large hydro-electric installation, which will make abundant and cheap electric power available on the northern iron ranges. 40c.

4576—PRODUCER GAS—Notes on the Use of Producer Gas for Power Purposes. J. R. Bibbins. (Engrs. Club of Phila., Proc., July, 1907; 19½ pp.) Discusses the operating efficiency of typical gas producer plants including diagrams of comparative fuel costs for different kinds of fuels; discusses also the limits of competition of producer gas with other kinds of gases. 40c.

4577—PRODUCER GAS—The Use of Producer Gas in the Chemical Industries. Oskar Nagel. (Electrochem. and Met. Ind., Sept., 1907; 1 p.) Outlines some of the advantages gained by using producer gas for melting, calcining, roasting, heating with reducing or oxidizing flame, and evaporating. 40c.

4578—PUMPING—Method of Working Pumps by Endless Wire Rope. F. W. Hardy. (Min. Engineering, Sept., 1907; 1 p.) Brief description of the working of pumps by endless wire rope, showing the arrangement of the pumps and the driving mechanism. 20c.

4579—ROASTING FURNACE—The McDougall Roasting Furnace. L. S. Austin. (Min. and Sci. Press, Aug. 31, 1907; 2 pp.) Deals with the construction and operation of this type of roasting furnace. 20c.

4580—ROCK DRILLS—A New Departure in Rock Drills. (Engineer, Lond., Aug. 30, 1907; 1 p.) Interesting account of a new invention whereby removable bits are provided for rock drill steels, thus overcoming the frequent necessity for changing the drill and searching for the proper length of steel to be used. 40c.

4581—STEAM BOILER FURNACES, The Lining of. W. Kavanagh. (Elec. Wld., Sept. 7, 1907; ½ p.) Considers several methods of lining boilers, furnaces, and gives especial attention to water tube types. 20c.

4582—SUPERHEATED STEAM—Heissdampf beim Betrieb einer unterirdischen Wasserhebmaschine der St. Pankras-Zeche in Nürschan. J. Divis. (Oest. Zeit. f. B. u. H., Aug. 24, 1907; 6 pp.) Relates to the use of superheated steam in subterranean engines and pumps, and gives specific information as to operating details and efficiency of such a pump installed in the St. Pankraz shaft in Nürschan. 40c.

4582a—TESTING MACHINE—An Electrically Controlled Single-Lever Testing Machine and Some Torsion Tests. C. E. Larard. (Instn. Mech. Engrs., July, 1907; 36 pp.) A very full account of the construction, design, operation and special features of the controlling apparatus connected with this testing machine. The noteworthy features of this machine are the control with respect to time-rate of straining and of loading which are obtained by the use of two electric motors of wide speed ranges.

ANALYTICAL CHEMISTRY

4583—ACETYLENE GENERATOR—Automatic Acetylene Generator for Chemical Laboratories. Randolph Bolling. (Eng. and Min. Journ., Aug. 31, 1907; 1 p.) Describes the design of a generator for use in chemical laboratories, with special reference to economical use of carbide. 20c.

4584—ASSAYING—Determination of Titanic Acid in Iron Ores and Slags. Alf. Grabe. (Jern kontorets Annaler, June, 1907; 28 pp.) Comparative description and criticism of the different methods employed.

4585—ELECTROLANALYSIS—Elektroanalytische Forschungergebnisse. F. Peters. (Glückauf, Aug. 17 and 24, 1907; 14 pp.) A review of the results of the most recent investigations into processes for analysing metals by electrolysis. To be continued. 60c.

4586—GAS ANALYSIS—Rapid and Accurate Gas Analysis. E. Barnhart. (Electrochem. and Met. Ind., Sept., 1907; 2 pp.) Describes the construction and the methods of manipulating a new type of apparatus for analysing gases with a considerable degree of accuracy and in less time than required by standard methods. 40c.

4587—LABORATORY RECORDS—The Systematic Keeping of Laboratory Records. R. K. Meade. (Chem. Engr., Aug., 1907; 3 pp.) Explains the card and loose-leaf system used by the author in his laboratory for keeping a record of samples and analyses. 40c.

MATERIALS OF CONSTRUCTION

4588—CONCRETE—Washing and Grading Sand for Concrete. W. E. Cook. (Proc. Royal Soc. of N. S. W., Vol. XL, 1906; 23 pp.) An account of an experimental investigation into the effect of eliminating clay and loam from concrete sand by washing, and tending to show that sand thus cleaned does not produce as strong a concrete.

4589—STRENGTH OF ANGLE IRON Tension Tests of Steel Angles with Various Types of End Connections. F. P. McKibben. (Iron Tr. Rev., Sept. 26, 1907; 4 pp.) Continuation of a series of tests made to determine the ultimate strength of steel angles in tension, the relative strength of single angles and angles riveted in pairs, their relative strength where the rivet line and the center of gravity pass through the center of pull, etc. Thirty-three specimens were tested and a full set of the figures obtained are given and the results and conclusions are discussed in detail. 20c.